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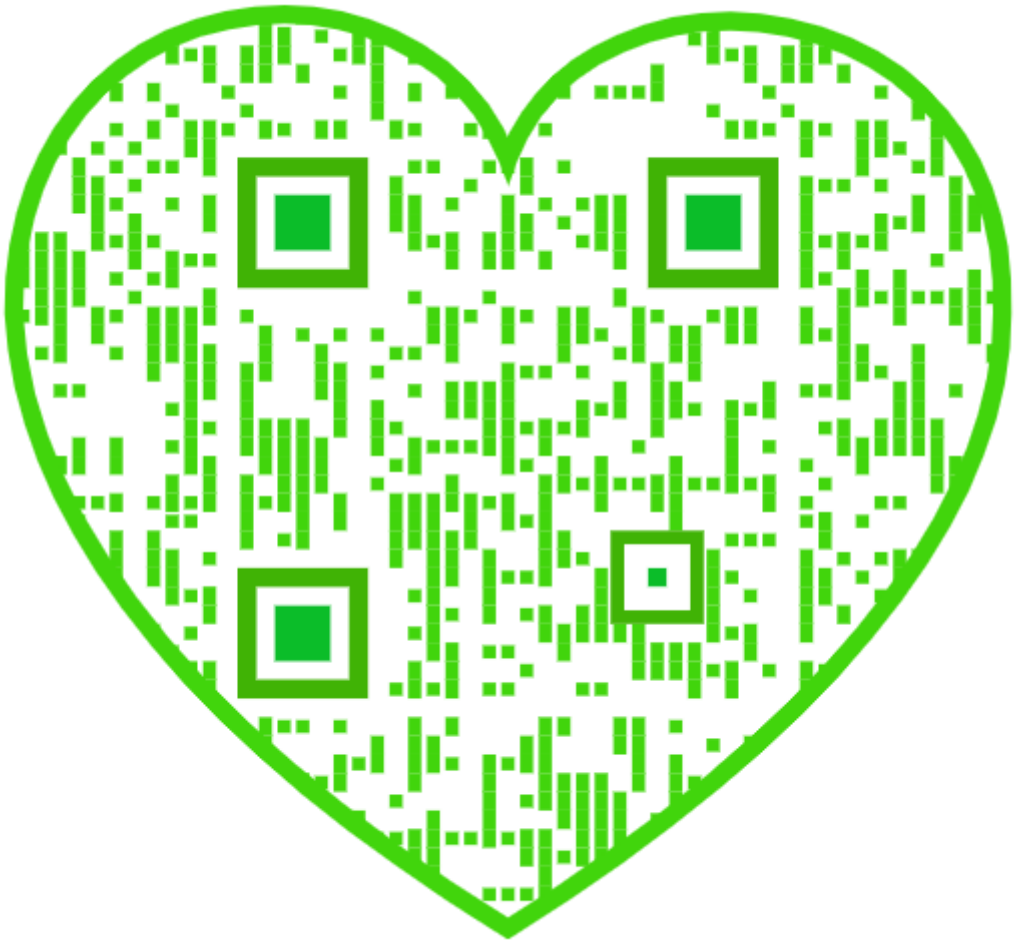

FORMULARY

FOR

THE PREPARATION AND EMPLOYMENT

OF SEVERAL

NEW REMEDIES:

NAMELY,

RESIN OF NUX VOMICA, STRYCHNINE, MORPHINE, HYDROCYANIC ACID, PREPARATIONS OF CINCHONA, EMETINE, IODINE, PIPERINE, CHLORURETS OF LIME AND SODA, SALTS OF GOLD AND PLATINA, PHOSPHORUS, DIGITALINE, &c.

TRANSLATED FROM THE SIXTH EDITION OF

THE FORMULAIRE OF M. MAGENDIE,

PUBLISHED IN PARIS, OCTOBER, 1827.

WITH AN

APPENDIX,

CONTAINING THE EXPERIENCE OF BRITISH PRACTITIONERS WITH MANY OF TH NEW REMEDIES.

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1830.

TRANSLATOR'S PREFACE.

The interest which has been excited by the discoveries of the French pharmaciens relative to the active principles of many of the more powerful articles of the Materia Medica, is shown by the demand for a sixth French edition of this Formulary.

M. Magendie has rendered to therapeutics an essential service, and deserves the thanks of the profession and of society. It is much to his credit, that he who has so distinguished himself in what are considered the higher departments of medical science, (viz. inquiries into the laws of the animal economy) should be the organ of communication to the public, not only of the observations he has made, upon the action of certain agents upon the animal system, but also of the method in which they may be prepared, evincing that he bears in mind that the main objects of all medical science are the alleviation of bodily suffering, and the cure of disease; and that this savant has a mind above all those prejudices which would separate what nature, humanity, and philosophy, have joined by indissoluble bonds.

It is to be feared, that the pharmaceutical part of medical science does not engage so much of the attention of practitioners of talent in this country, as it deserves: if such be really the case, it is to be lamented, since it does appear evident that the therapeutic art cannot be duly advanced, unless those who prescribe do also well understand the nature of the substances they employ; and unless, if occasion require, they be able to identify the articles; it is also important that they should know by how many circumstances their medicinal action may be modified, or even destroyed.

During the last season the writer had leaves of the verbascum thapsus brought to him, for those of digitalis purpurea; an inert article for a powerful medicine, and on which the hopes of a large family, or a distressed parent, might have vainly rested.

Much praise is due to MM. the pharmaciens of France, who, for the benefit of the public, have liberally communicated their methods of preparing those valuable medicinal compounds, which have proved so beneficial to the diseased; it is to be hoped that our operative chemists will follow their example, and that they will not allow the *amor sceleratus habendi* to tarnish their philosophy.

The writer trusts this translation will be found to be faithful and clear: he has endeavoured to make it as extensively useful as possible, for which reason he has reduced all the weights and measures to round numbers, as will be seen in the tables annexed; he has not translated the French terms of weights and measures, which occur in the body of the work, lest it might lead to mistakes; for we have no terms which do exactly correspond with them, as respects their value.

The greatest liberty that has been taken with the author's terms, relates to those used for the doses of medicine, and are *cuilléree à bouche*, (mouth-spoonful,) and *cuilléree à café* (coffee-spoonful); now as these are recognised in the *Pharmacopée Francaise*, by Ratier, as indicating determinate quantities, the mouth-spoonful being five *gros*, or ʒvss, and the coffee-spoonful five *grammes*, ʒi ℿ20; and as they had both been rendered in the former English edition dessert-spoonfuls, it has been thought advisable to adopt this arrangement in consideration of the very powerful nature of the substances which enter into most of the formulæ, and the melancholy consequences that might result from an over-dose.

11, Grove-Place, Alpha-road.
4th Dec. 1827.

Table showing the specific gravity that corresponds with the degrees of the aerometer of Baumé, which is used in France.

Temperature 55 Fah.

Deg. B.	Sp. Gr.	Deg. B.	Sp. Gr.	Deg. B.	Sp. Gr.	Deg. B.	Sp. Gr.
10	=1000	18	=.942	26	=.892	34	=.847
11	.999	19	.935	27	.886	35	.842
12	.985	20	.928	28	.880	36	.837
13	.977	21	.922	29	.874	37	.832
14	.970	22	.915	30	.868	38	.827
15	.963	23	.909	31	.862	39	.822
16	955	24	.903	32	.857	40	.817
17	.949	25	.897	33	.852		

Vide Ure's Chem. Dict.

The thermometer used by the French chemists is that of Celsius, and commonly called the centigrade, from the scale containing exactly 100 degrees from the freezing to the boiling points of water, under the ordinary pressure. One degree of the centigrade is therefore equal to one degree and four-fifths of Fahrenheit, or as 9 is to 5, in calculating, when the temperature is above 0 centigrade, 32 should be added if it is to be reduced to the scale of Fahrenheit. Thus 5° cent. is 41° Fah.

French weights reduced to Troy weight in round numbers.

	Ounces.	Drachs.	Grains.
Kilogramme . .	32	1	13
Demikilogramme .	16	0	$36\frac{1}{2}$
Livre	15	6	1
Once	0	7	$52\frac{1}{2}$
Gros	0	0	59
Gramme	0	0	$15\frac{2}{5}$
Grain	0	0	$0\frac{4}{5}$

The grain is the 19th part of a gramme.

The above calculation will be found sufficiently correct for practical purposes: the fractions may be seen decimally expressed in Ure's Dictionary, Brande's Manual, Thompson's Dispensatory, and in most of the systematic works on Pharmacy or Chemistry.

French measures of capacity reduced to English fluid measure in round numbers.

	℥	ʒ	♏
Litre	35	2	12
Pinte	32	2	11
Livre	16	1	40
Once	1	0	40
Gros	0	1	5
Gramme . . .	0	0	16

AUTHOR'S PREFACE

TO THE SIXTH EDITION.

NOTWITHSTANDING the opposition made by the physicians of the seventeenth century, the celebrated decree of parliament, which prescribed emetic tartar —and the spiritual sarcasms of Guy Patin—the utility of antimonial preparations has been long recognised. For once, at least, prejudice has submitted to the power of evidence.

It will be the same, I hope, with respect to the new substances which chemistry and physiology hold out to us, as valuable remedies; and that the repugnance with which many enlightened practitioners regard them, will soon disappear before the results of an experience which daily shows their importance.

The impossibility of isolating by chemical analysis the elements of medicines, has much retarded the progress towards perfection of the Materia Medica; and even now, when such an analysis can be made, the belief that existed, and which still exists in some degree, that medicinals act altogether differently on man to what they do on animals, has prevented the ultimate principles of remedies from being investigated. Still nothing is more unfounded than this belief. A varied experience of more than fifteen years, both in the laboratory and at the bed-side, induces me to affirm, THAT MEDICINES AND POISONS ACT IN THE SAME MANNER ON MAN AS ON ANIMALS.*

I am so sure of this, that I would willingly try on myself substances which have been proved to be innocent when given to animals; but I would not recommend any one to make the experiment inversely.

* Those animals which approach nearest to man in their organization.

The physiological properties and medicinal virtues, of most of the substances described in this Formulary have been determined by a reference to the above principle.

These substances, which are already sufficiently numerous, act when given in small doses; every principle which might mask or hinder their action, has been separated from them; their effects bear a decisive character, which cannot be misunderstood, for they have been studied with care, both on animals and on man, when in health and when in disease; a perfect knowledge of their chemical properties, and great accuracy in their mode of preparation, are sufficient to secure uniformity with regard to their strength, and manner of action; and, lastly, each of them forms a medicine in its most simple and also in its most energetic state.

Time alone can pronounce definitively on the advantages and inconveniences of these new remedies; but, whichever way it may be, the following pages may be useful, by teaching the mode of preparing them, without making it necessary to consult general treatises on chemistry or pharmacy; and by giving medical men every facility in submitting them to personal experience, which is frequently, after all, the only truly profitable course.

I shall feel extremely grateful for any critical or other remarks appertaining to the substances treated of in this work. To those of my medical brethren who may be kind enough to address them to me, I return my thanks beforehand; and I shall hasten to turn them to the improvement of science, by inserting them in the next edition.

This edition differs from its predecessors, by a great number of additions and changes, which the daily advancement of Medical and Pharmaceutical Chemistry have necessarily induced.

PARIS,
October, 1827.

CONTENTS.

Page

RESIN OF NUX VOMICA 13
Preparation of the alcoholic extract.. 13
Action on the animal system..... 14
Practical employment 15
Method of employing..... 15
Tincture of nux vomica..... 16

STRYCHNINE 16
Mode of preparing..... 16
Sensible and chemical properties.... 17
Action on the animal system..... 19
Medicinal employment 19
Mode of employing 20
Pills of strychnine 20
Tincture of strychnine 20
Mixture of strychnine..... 20
Salts of strychnine..... 20
Action of the salts of strychnine.... 21
Mode of employment 22

BRUCINE 22
Mode of preparing 22
Properties of brucine..... 23
Action on the animal system 24
Manner of administration..... 24
Cases for the exhibition of brucine.. 24
Mode of prescribing 25
Pills of brucine 25
Tincture of brucine..... 25
Stimulating mixture 25
Salts of brucine 25

MORPHINE 26
Indigenous morphine 27
Preparations of exotic morphine.... 27
Action on the animal system 28
Preparation of the acetate..... 29
To prepare the sulphate..... 30
Administration of the salts of morphine 30
Syrup of the acetate..... 30
Syrup of the sulphate..... 31
Solution of morphine 31
Solution of the citrate..... 31
Extract of opium deprived of morphine 33

NARCOTINE, OR MATIERE DE DEROSNE 33
Action on the animal system..... 33

Page

Extract of opium deprived of narcotine 34
Mode of preparation 35
Action on the animal system 36

EMETINE..... 36
Preparation of coloured emetine.... 36
Action on the animal system 37
Medicinal employment 38
Emetine mixture..... 38
Pectoral lozenges of emetine..... 38

PURE EMETINE 39
Mode of preparation 39
Physical and chemical properties.... 40
Action on the animal system 41
Medicinal employment 41
Emetic mixture of pure emetine 41

ALKALIES OBTAINED FROM CINCHONA BARK 41
Mode of preparing quinites of quinine and cinchonine..... 44
Chemical properties of cinchonine.. 45
Chemical properties of quinine..... 45
Preparation of the sulphate of quinine 46
Preparation of the supersulphate of quinine 48
Comparative analysis of the two sulphates of quinine 48
Acetate of quinine..... 49
Citrate of quinine 49
Action on animals 50
Action on the human system in health and in disease 50
Medicinal employment of cinchonine and quinine 53
Syrup of quinine 55
Quinine wine 55
Tincture of quinine..... 55
Preparations of cinchonine 55
Syrup of cinchonine 56
Cinchonine wine 56
Tincture of cinchonine 56

MEDICINAL EMPLOYMENT OF SULPHATE OF QUININE IN COMBINATION WITH OTHER MEDICINES 57
Sulphate of quinine with opium..... 57

Page
Medicinal employment 57
Sulphate of quinine combined with tartarized antimony 58

Veratrine 58
Mode of preparing veratrine 59
Chemical properties 60
Action on animals 60
Action on the human system in health and in disease 61
Cases proper for its exhibition 62
Medicinal employment 63
Pills of veratrine 63
Tincture of veratrine 63
Solution of veratrine 63
Ointment of veratrine 63

Prussic, or hydrocyanic acid 63
Physical properties 64
Chemical properties 64
Preparation of prussic acid 65
Action on animals 66
Action on the human system 66
Cases in which it may be employed .. 66
Medicinal employment 68
Pectoral mixture 69
Pectoral potion 69
Cyanic syrup 69
Mixture for lotions 70
Remarks on prussic acid 70

Solution of cyanuret of pure potassium, as a substitute for prussic acid 71
Mode of preparation 71
Action of cyanuret of potassium and of hydrocyanate of potass on animals 72
Medicinal employment 72
Pectoral mixture 73
Pectoral drink 73
Potion with cyanuret of potassium .. 73
Syrup of hydrocyanate of potass 73

Cyanuret of zinc 74
Mode of preparation 74
Medicinal employment 74

Cyanuret of iodine 75
Physical and chemical properties ... 75
Process for obtaining the cyanuret of iodine 76
Composition of the cyanuret of iodine 77
Action on the human system 77

Solanine 78
Mode of preparation 78
Properties of solanine 79
Action upon animals 79
Action on the human system 79
Cases for its administration 80

Delphine 80
Mode of preparation 80

Page
Properties of delphine 81

Gentianine 81
Preparation of gentianine 82
Properties of gentianine 83
Action on the animal and human system 83
Medicinal employment 84
Syrup of gentianine 84

Iodine 84
Physical and chemical properties ... 85
Mode of preparation 86
Preparation of the hydriodates of potass and soda, both simple and ioduretted 87
Ioduretted hydriodate of potass 89
Action of iodine on the animal system 89
Cases in which the preparations of iodine may be employed 90
Medicinal employment 93
Tincture of iodine 95
Ioduretted sulphuric ether 95
Solution of hydriodate of potass 96
Ointment of hydriodate of potass ... 97
Ointment of iodate of zinc 97

Iodurets of mercury 98
To prepare the proto-iodurct of mercury 98
To prepare the deuto-ioduret 98
Medicinal employment of the iodurets of mercury 99
Ointment of the proto ioduret of mercury 99
Ointment of the dueto-ioduret of mercury 99
Tincture of the dueto-ioduret of mercury 99
Sulphuric ether, with deuto-ioduret of mercury 99
Pills of the deuto-ioduret of mercury 99
Pills of the proto-ioduret of mercury 100

Lupuline 100
Action on the animal system 100
Medicinal employment 101
Powder of lupuline 101
Pills of lupuline 101
Tincture of lupuline 101
Extract of lupuline 101
Syrup of lupuline 101

Oil of croton tiglium 102
Mode of preparation 103
Dr. Nimmo's process 103
Action on the animal system 104
Medicinal employment 105
Soap of the oil of croton 106

Piperine 107
Mode of preparation 107

Page
Cases in which it may be administered 108

Urea 109
Physical and chemical properties... 109
Process for obtaining it..... 110
Action on the animal system 110
Medicinal employment..... 111

Oil of euphorbia lathyris..... 111
Process for obtaining the oil..... 111
Physical and chemical properties... 111
Action upon the animal system.... 112
Cases in which it may be administered 112
Mode of prescribing..... 112

Lactuarium 113
Physical and chemical properties .. 113
Mode of preparation 114
Action on the animal system..... 115
Cases proper for its exhibition 116

Salts of gold 117
Mode of preparing the chloruret of gold..... 117
Physical and chemical properties .. 118
Mode of preparing chloruret of gold and sodium, or muriate of gold and soda 118
Physical properties..... 119
Mode of preparing the oxide of gold 119
Physical and chemical properties .. 120
Mode of preparing the oxide of gold by means of tin 121
Action of the salts of gold on the animal system..... 121
Cases in which the preparations of gold have been administered..... 123
Medicinal employment..... 124
Powder of the muriate of gold and soda 125

Page
Pills of the oxide of gold 125

Salts of platina 126

Bark of the root of the punica granatum 126
Medicinal employment 127
Decoction of the bark of the pomegranate root 127

Fatty principle of the buds of the aspidium filix mas 128

Chlorurets of lime and of soda..... 128
Mode of preparing the chlorurets of soda, and of lime 129
Chloruret of soda..... 129
Mode of employing the chloruret of soda..... 130
Chloruret of lime 131
Mode of employing the chloruret of lime 132

Phosphorus 133
On the employment of phosphoric acid..... 137
Mode of preparing phosphorized medicines, and method of employing them 138

Lozenges of the bi-carbonate of soda, or digestive lozenges..... 141
Mode of preparing the digestive lozenges..... 142
Formula of M. D'Arcet 142
Medicinal employment 142

Digitaline 143
Mode of preparation 143
Action on the animal system 144

APPENDIX.

Page
Nux vomica..... 3
Dr. Good on 3
Dr. Elliotson on..... 3
Dr. Scudamore on 4
Poisonous effects of 4

Morphia..... 5
Black drop 5
Liquor opii sedativus 5
Acetate of..... 5

Sulphas quiniæ..... 6
Dr. Elliotson on..... 6

Prussic acid..... 7
Dr. Granville on 7
Dr. Elliotson on..... 8
Dr. Ure on 9

Page
Antidote to..... 9

Iodine 10
Dr. Elliotson on..... 10
Dr. Manson on 11
Formula of Dr. Manson 12
Dr. Copland on 12
Dr. Baron on 12
Dr. Gairdner on 12
Effects of an over-dose of 13

Croton tiglium 15

Chlorurets of soda and of lime.. 15
Mr. Alcock on..... 15
Dr. Elliotson on..... 16
Dr. Copland on 17
Mr. Fincham on..... 17

FORMULARY, &c.

RESIN OF NUX VOMICA.

In 1809, M. Magendie presented to the Institute of France some account of a course of experiments, which led to an unexpected result, viz. that an entire family of plants (the Strychni-Amari) possessed the singular property of strongly exciting the spinal marrow, without affecting, except indirectly, the functions of the brain; and it was remarked, at the close of this report, that such a result might be turned to advantage in the treatment of diseases. This conjecture has since been amply confirmed at the bedside of the patient. Some years ago, Dr. Fouquier published several cases in which paralysis had been cured by nux vomica; and M. Magendie himself had met with success of a similar nature before he knew that this gentleman had been so occupied. The circumstance has in no way tended to abate our author's diligence; and most satisfactory results have been obtained from the exhibition of the alcoholic extract of nux vomica, not merely in palsies, both partial and general, but also in various other kinds of debility of the system, general as well as local.

PREPARATION OF THE ALCOHOLIC EXTRACT OF NUX VOMICA.

Treat a given quantity of rasped nux vomica with alcohol at 40°,* and at the lowest possible temperature; let it be renewed until nothing farther is taken up from the rasp-

* By the dèromèter of Baumé.—See scale for reducing the French Weights and Measures to the English standard at the end of the Translator's Preface.

ings; then evaporate gently to the consistence of an extract. The activity of the matter obtained will be in proportion to the strength of the alcohol. The alcoholic extract may be obtained dry, by filtering a saturated tincture (made with alcohol at 36°), and evaporating in the common way.

ACTION ON THE ANIMAL SYSTEM.

One grain of this substance absorbed in any part of the body, or taken into the stomach with food, will destroy a large dog in a very short time, by producing paroxysms of tetanus which interrupt respiration, until complete asphyxia ensues; and when a larger quantity has been administered, the animal has been destroyed by its direct action on the nervous system. A contraction of the spleen has been observed in animals which have been poisoned by this substance. On touching an animal under the action of this resin, a sensation similar to a strong electric shock is felt. The division of the spinal marrow, and even complete decollation, do not interfere with the peculiar action of this substance. Its effects on the human subject are exactly the same; and no indication of the nature of its action, or of its exhibition, is traceable in the body after death.

The effects, in cases of paralysis, are similar to those described; but they are exerted in a remarkable manner upon the parts affected. These are the seat of tetanic shocks, of a prickly sensation, and of a perspiration, which is not observed elsewhere. In hemiplegia the sound side of the body remains tranquil, while the affected one is the seat of extreme agitation; the tetanic attacks succeed each other rapidly, and an abundant exudation takes place. Even an anomalous eruption has been observed, while the healthy side has been perfectly free. One side of the tongue is sometimes sensible of a decidedly bitter taste, which is not perceptible on the other. If the dose be augmented, both sides become the seat of tetanic action, though not equally so. Sometimes the effect is so violent as to throw the patient out of bed. In a very small quantity, this extract has no immediate action, at least of a perceptible kind; and it

is not until after several days that its good or bad effects display themselves.

PRACTICAL EMPLOYMENT OF THE ALCOHOLIC EXTRACT OF NUX VOMICA.

It may be given in all diseases of debility, whether local or general—and in palsies of every description. It has been administered with perfect success in amaurosis accompanied with paralysis of the upper eyelid;* and very good effects have followed its exhibition in weakness of the genital organs and of the stomach, incontinence of urine, and extreme general debility, accompanied with an irresistible disposition to somnolency. It has been recently tried with advantage in partial atrophy of the extremities, both superior and inferior.† The medicine, however, must not be exhibited immediately after the apoplectic attack which has caused the paralytic affection; nor is a cure to be expected from it where there is a lesion of the brain.

It has been given to the extent of twenty grains in a case where paralysis supervened to an attack of apoplexy, without benefit,‡ although the tetanic affection of the parts involved was considerable. Many physicians have borne testimony, however, to the efficacy of the medicine in all the varieties of nervous debility; and since the publication of the former edition of this Formulary, several cases of success, in paralysis more especially, have been recorded. M. Chauffart, in particular, has reported the cure of a case of palsied rectum.§

METHOD OF EMPLOYING THIS REMEDY.

The preferable form is that of pills, each containing one grain of the extract; we may commence with one or two daily, increasing the dose until the desired effect be pro-

* By Mr. Edwards. † Experience of M. Magendie.
‡ By M. Chauffart. Journ. Gen. de Med. Oct. 1824.
§ Dr. Baxter (New-York Med. Repos. vol. 8) records a case of hemiplegia in a child, which was cured by this medicine. A very satisfactory one is reported by M. Gendron in the Journ. General for November, 1824. It has been given with success too in a case of chorea sancti viti.

duced. The pills should be given in the evening, as the night time is the most proper for observing the phenomena. In general, from 4 to 6 grains per diem will be sufficient to produce tetanic action ; but sometimes it has required as much as 24 or 30 grains in the day. If it should be found necessary to suspend the medicine for a time, it must be recommenced with small doses, and gradually increased. When it is intended to produce but slight effects, one grain, or even half a grain per diem will be sufficient. A tincture may also be employed according to the following formula.

TINCTURE OF NUX VOMICA.

Take of Alcohol at 36°..... 1 once.*
Dry extract of Nux Vomica..... 3 grains.
Dissolve.

Of this a few drops may be given in any simple vehicle. In this form it may also be used by friction upon the parts affected ; it is a mode much employed in Italy, and from which M. Magendie has seen great benefit result in his own practice.

STRYCHNINE.

Nux vomica, alcoholic extract of nux vomica, St. Ignatius' bean, the upas tieute of Java,† and the snake-wood,‡ owe their intense powers of acting on the animal economy to two peculiar vegetable alkalies, discovered by Messrs. Pelletier and Caventou, and denominated strychnine and brucine. These principles exist in the above-mentioned substances in a state of combination, with an acid called the igazuric.§

MODE OF PREPARING STRYCHNINE.

Dissolve the alcoholic extract of nux vomica in water,

* See the scale for reducing the French Weights and Measures to the English standard, at the end of the Translator's Preface.

† This is a different substance from the *upas anthiar* of the same island; the latter destroys life in a few minutes by exciting vomiting: the other by tetanic convulsions.

‡ Lignum, or Strychnos Colubrinum.

§ Annales de Chimie, tom. x. an 1819.

and add to the solution subacetate of lead in a fluid form, until precipitation ceases. The superfluous bodies being separated in this manner, the strychnine remains in solution, with a portion of colouring matter, and sometimes an excess of acetate of lead. The lead is to be separated by sulphuretted hydrogen: then filter, and boil the liquid with magnesia; which, combining with the acid, yields a precipitate of strychnine and brucine. This is to be washed with cold water, and redissolved in alcohol, in order to separate the excess of magnesia, and then by evaporating the alcohol we get a mixture of strychnine, brucine, and colouring matter. The whole is macerated in a small quantity of weak alcohol, which readily dissolves the two latter bodies, while the strychnine remains in the form of a powder. It is taken up again by boiling in rectified alcohol; which, being evaporated, deposites the strychnine in a crystalline form. We must take care to leave a little alcoholized water, in order to retain what remains there may be of the brucine. The strychnine may be obtained still purer, by renewing the crystallization. The sign of its purity is its not reddening with nitric acid, a degree almost unattainable in strychnine procured from nux vomica. That obtained from St. Ignatius' bean is purer; but the purest and most easily obtained is furnished by the upas.

SENSIBLE AND CHEMICAL PROPERTIES.

Strychnine obtained in this way presents itself under the form of minute crystals, which, by the aid of the microscope, are found to consist of four-sided prisms, terminated by pyramids with four depressed faces. When rapidly crystallized, it is white and granular, intolerably bitter, and leaving an impression on the organs of taste like that of some metallic salts; it has no smell, and undergoes no alteration by exposure to the air; it is neither fusible nor volatile; suffering decomposition and carbonization at the point of fusion, which is at a degree of heat below that required for the destruction of most vegeto-animal matters.

Exposed to the naked fire, it swells, blackens, and gives out an empyreumatic oil, a small portion of water and ace-

tic acid, some indications of carbonic acid gas, carbonated hydrogen, and carbonate of ammonia. Distilled with the deutoxide of copper, it yields a large quantity of carbonic acid and azote.

According to Messrs. Dumas and Pelletier, the mean of two analyses of strychnine is, per hundred parts,*

Carbon	78.22
Azote	8.52
Hydrogen	6.54
Oxygen	6.38
	100.06

Strychnine is of all vegetable principles that which contains the most azote. It is nearly insoluble in water, requiring 6.667 times its weight, at a temperature of 10°, but of boiling water half the quantity will dissolve it. This will appear remarkable, if we consider the intense bitterness of its taste, which will be still distinctly perceptible, if a solution of strychnine made in cold water, and consequently not containing above $\frac{1}{6000}$ part of its volume, be diluted in a hundred times the quantity of the same fluid. Its principal chemical characteristic is its readiness to form neutral salts by uniting with acids.

Acording to recent experiments of Pelletier and Caventou, the above-mentioned process indicates, in nux vomica, the presence of two alkaline principles, the one strychnine, the other brucine, which had already been found by the same chemists in the brucea antidysenterica. To obtain strychnine pure, it is necessary to crystallize it repeatedly in alcohol; the other principle, the brucine, namely, being more soluble in this menstruum, and crystallizable with difficulty, remains in the alcoholic mother-water. The presence of brucine with the strychnine is, however, of no great importance, as it possesses the same properties, though less energetic.

M. Henry obtains strychnine by boiling nux vomica in water, evaporating to the consistence of syrup, and then adding lime, which combines with the acid and sets the strychnine free. This is again separated from the lime by

* See Recherches sur la composition élémentaire des bases salifiable organique, par MM. Dumas et Pelletier.

means of alcohol; the strychnine, first dissolved in this menstruum, is finally obtained by evaporation; and in order to ensure its purity, it is redissolved in spirit and crystallized a second time.

The same gentleman points out another mode of purifying strychnine by combining it with nitric acid; but the muriatic or sulphuric acids are preferable, the manipulation with nitric acid requiring very great care. The salt is crystallized, after it has been deprived of colour by means of animal charcoal, and finally the strychnine is precipitated by ammonia. The circumstance of nux vomica containing brucine, does not seem to have been known when M. Henry announced his processes: the fact is, that by crystallizing the strychnine, it will be obtained sufficiently pure; whereas, by the method of precipitation, it will contain a considerable quantity of brucine, and will act, in consequence, with less energy on the animal system.

It is unfortunate that the bean of St. Ignatius is so rare an article in commerce, as the strychnine contained in it is nearly free from brucine, and would be readily obtained from it in a state of purity.

ACTION OF STRYCHNINE ON THE ANIMAL SYSTEM.

The action of strychnine on man and the lower animals is exactly like that of the alcoholic extract of nux vomica, though more powerful. One-eighth of a grain is sufficient to kill a large dog, and a quarter of a grain has often produced very great effect upon man in health.

MEDICINAL EMPLOYMENT.

As a remedy, it is applicable in the same cases as the resin of nux vomica; and it might never be necessary to have recourse to strychnine if the extracts of the nux were always prepared in the same manner, and exempt from those variations in their effects which result from peculiarities in their mode of preparation. In consequence of its greater uniformity in this respect, it is in general

preferable. Both in Germany and Italy accounts have been published of its successful employment.*

MODE OF EMPLOYING STRYCHNINE.

PILLS OF STRYCHNINE.

Take of Very pure strychnine..... 2 grains.
Conserve of roses..... ½ gros

Mix accurately, and divide into 24 equal pills.

TINCTURE OF STRYCHNINE.

Take of Alcohol at 36°..... 1 once.
Strychnine..... 3 grains.

Dose from 6 to 24 drops, in draughts or common drink.

The following mixture has frequently been used.

MIXTURE OF STRYCHNINE.

Take of Distilled water..... 2 onces.
Very pure strychnine..... 1 grain.
White sugar..... 2 gros.
Acetic acid..... 2 drops.

Five *grammes* to be taken morning and evening.

SALTS OF STRYCHNINE.

United with acids, this substance forms salts which are crystallized, and for the most part soluble. This latter property must therefore be borne in mind, when giving strychnine in common drink, for lemonade and all acids very much increase its activity. The subcarbonate of strychnine is sparingly soluble.

The SULPHATE is soluble in less than ten parts of cold water; it crystallizes in small transparent cubes if neutral, and in needles if there be a preponderance of acid. Its taste is extremely bitter. It is decomposed by every soluble salifiable basis. It undergoes no alteration by exposure to the air. Heated at a temperature of 100°, it loses

* By Cramer of Bonn, and Diffenbach of Germany—and particularly by Cattaneo, who has published his Observations in Omodei's *Annali Universali*.

no part of its weight, but becomes opaque. At a higher temperature it fuses, and resolves itself into a mass, after suffering a loss of 3 per cent. If the heat be farther augmented it decomposes. It consists of

Sulphuric acid	9.5
Strychnine	90.5
	100

According to MM. Dumas and Pelletier, 100 parts of the base saturate 10.486 of acid.

The HYDROCHLORATE is still more soluble than the sulphate ; it crystallizes in needles, which, viewed through a lens, appear to be quadrangular prisms ; when exposed to a temperature at which the base is decomposable, it gives off muriatic acid.

The PHOSPHATE can be obtained in a perfectly neutral state, only by double decomposition. It crystallizes in four-sided prisms.

The NITRATE is easily obtained, by dissolving strychnine in acid highly diluted. Upon evaporation it crystallizes in needles of a pearly aspect.

This salt is much more soluble in hot than in cold water, and its action is more violent than that of the strychnine itself.

It forms very soluble salts also with the acetic, oxalic, and tartaric acids, susceptible of crystallization, especially if the acid be in excess. The neutral acetate is very soluble and does not readily crystallize. The hydrocyanic acid forms with this base a crystallizable salt.

The SUBCARBONATE is obtained in the form of white flakes.

Boiled with iodine it forms an IODATE and HYDRIODATE.

A large proportion of acid combined with a very small quantity of strychnine, would form a medicine possessing the double property of acting on the nutrition of the organs, and of exciting the nervous system.

ACTION OF THE SALTS OF STRYCHNINE.

The salts of strychnine, in consequence of their greater

solubility, are more active, and consequently more intensely poisonous than their base.

MODE OF EMPLOYMENT.

When the patient is habituated to the action of strychnine, it may sometimes be advantageous to substitute the salts for the strychnine itself, without increasing the dose. M. Magendie, has used none of the salts except the sulphate, which has produced most decided relief in a case of paraplegia given in a dose of a twelfth of a grain.

BRUCINE.

This base was discovered in the inner bark of the Brucea antidysenterica, by Pelletier and Caventou in 1819. It is there combined with gallic acid, and exists in the state of a gallatese. The chemists have since found it united with strychnine in the nux vomica. In the bean of St. Ignatius, and in upas, the brucine performs the same part with respect to the strychnine that the cinchonine does to the quinine, the more active barks contain the greater quantity of quinine, while the bean of St. Ignatius and the upas tieute are more active than the nux vomica, containing a greater proportion of strychnine.

MODE OF PREPARING BRUCINE.

In order to obtain BRUCINE, the inner bark of the brucea dysenterica is subjected to a process similar to that directed for the preparation of strychnine, with this difference, that in the present case the magnesian precipitate must not be so elaborately washed, brucine being much more soluble in water than strychnine, on account of the greater quantity of colouring matter it contains. By evaporating the alcoholic liquors employed for the treatment of the magnesian precipitate, the brucine is readily obtained in a resinous form, not being yet sufficiently pure to crystallize. In its purification it must be combined with oxalic acid, and this oxalate is to be treated with a mixture of alcohol at 40°, and ether at

60°. In this way the colouring matter will be dissolved, and the oxalate of brucine will remain under the form of a white powder: it may be decomposed by magnesia, and the brucine separated by alcohol. In evaporating the alcoholic solution in the open air, brucine will be obtained in a crystallized form: if heat be employed it will be obtained fused, but not less pure.

PROPERTIES OF BRUCINE.

Its taste is intensely bitter; it is sparingly soluble in water, although more so than strychnine. It dissolves in 500 times its weight of boiling water, and in about 850 of cold water. When regularly crystallized it presents itself under the form of oblique prisms, with parallelogrammic bases. This form of brucine is a true hydrate, its affinity for water being considerable; whereas pure strychnine can never pass to this state. Brucine loses a considerable quantity of water by fusion.

Two hundred parts of brucine thus crystallized yield of

Water	37 parts.
Residue	163

One hundred and sixty-one parts, crystallized in alcohol, give of

Water	27 parts.
Residue	134

which establishes the constitution of the hydrate, taking the mean to be

Water	21.65 parts.
Brucine	100

It fuses at a temperature nearly equal to that of boiling water, and in cooling assumes the consistence of wax. It combines with acids, and forms with them neutral salts, of which the greater part are susceptible of regular crystallization. On applying concentrated nitric acid, it acquires an intense crimson colour, which passes into a yellow by the application of heat. If, while in this state, a solution of the proto-hydrochlorate of tin be added, we have a magnificent violet-coloured precipitate, which phenomenon is peculiarly characteristic of brucine; so that if strychnine obtained from nux vomica exhibits a similar appearance

on the addition of the proto-hydrochlorate, we may be assured that it is owing to the presence of brucine.

The mean result of two analyses of this substance, obtained from the brucea antidysenterica and fused in vacuo, gave as its composition,

Carbon	75.04
Azote	7.22
Hydrogen	6.52
Oxygen	11.21
	100.00*

ACTION ON THE ANIMAL SYSTEM.

This is analogous to that of the strychnine, but less intense, being in the proportion to that of pure strychnine as 1 : 12. Or, according to M. Andral, jun., 6 grains of brucine are equal to one of impure, and a quarter of a grain of pure strychnine. Four grains of brucine were required to kill a rabbit: and a strong dog having taken the same quantity experienced severe attacks of tetanus, but recovered. It may, therefore, be a convenient substitute for strychnine, as it will not act with so much energy.

MANNER OF ADMINISTRATION.

It may be given either in pills or tincture, increasing the dose gradually. In medical use, that which is obtained from the bark of the brucea antidysenterica should be preferred; as that furnished by the nux vomica is rather apt to be mixed with a portion of strychnine, which increases its power, and deranges our calculation as to the effects.

CASES FOR THE EXHIBITION OF BRUCINE.

As it possesses the properties of strychnine, in a milder degree, it may be given to the extent of one, two, or even three grains, without apprehension as to the consequences, in the same cases as the preparations of nux vomica are

* Almost—being in fact 99.99.

found to benefit. It is probable that much larger doses may be given, but we must be attentively upon our guard. M. Andral, jun. has given it in cases of palsy with advantage from half a grain to five grains. M. Magendie has administered it successfully in two cases of atrophy, one of the arm and the other of the leg. The patient took six pills daily, of one-eighth of a grain.

MODE OF PRESCRIBING BRUCINE.

PILLS OF BRUCINE.

Take of Pure brucine..... 12 grains.
Conserve of roses..... ½ gros.

Mix accurately, and divide into 24 equal pills.

TINCTURE OF BRUCINE.

Take of Alcohol at 36°..... 1 once.
Brucine..... 18 grains.

From 6 to 24 drops may be given in ordinary drink.

STIMULATING MIXTURE.

Take of Distilled water..... 4 onces.
Very pure brucine..... 6 grains.
White sugar..... 2 gros.

Mix.—Five *gros* to be taken night and morning.

SALTS OF BRUCINE.

Sulphate. This salt crystallizes in long needles, resembling four-sided prisms, terminated by extremely delicate pyramids. It is very soluble in water and in alcohol: its taste is exceedingly bitter. It is decomposed by potash, soda, ammonia, baryta, strontian, lime, magnesia, morphine, and strychnine. The supersulphate crystallizes more readily than the neutral salt, and is formed of

Sulphuric acid.....	8.84....	5.
Brucine.....	91.16....	51.582.

Hydro-chlorate. This salt crystallizes in four-sided

prisms, terminated by an oblique surface. It is not acted upon by the air, and is very soluble in water. It is decomposed by the sulphuric acid, while the nitric acts on and even destroys the brucine. It consists of

Acid.....	5.953....	4.575.
Brucine.....	94.046....	72.5.

The PHOSPHATE is also crystallizable, very soluble, and slightly efflorescent, the acetate, tartrate, and oxalate may also be crystallized.

The NITRATE is a mass bearing some resemblance to gum.

The SULPHATE and MURIATE of brucine being more soluble than brucine itself, probably possesses certain advantages, and have in all likelihood greater activity: they may therefore be employed instead of the preparations above described.

MORPHINE.

MM. DEROSNE, Sertuerner, Robiquet, and Robinet, have found that opium is composed, 1, of a fixed oil; 2, of matter resembling caoutchouc; 3, of a vegeto-animal substance not yet sufficiently examined; 4, of mucilage; 5, of fecula; 6, of resin; 7, remains of vegetable fibre; 8, of narcotine; 9, meconic acid.*

M. Robiquet has recently ascertained that neither codeic acid nor codeate of morphine exists in opium: what have been supposed to be such were either an acid salt or hydroclorate of morphine. This salt will even vary according to the nature of the saline solution to which the opium is submitted: thus it may be a sulphate or nitrate of morphine, if the sulphate of soda or nitrate of potash be employed.

The same gentleman has ascertained the interesting fact, that morphine has the property of producing a blue colour when combined with the salts of iron, at the maximum of oxidation.

* From the observations of M. J. Fenoglio, it appears, that meconic acid does not possess that febrifuge property which has been ascribed to it. (Annal. Univ. di Medicine). Oct. et Nov. 1813.

INDIGENOUS MORPHINE.

Morphine is afforded by opium of French produce, as well as by the aqueous extract of dried French poppy-heads, where it exists in the same state as in the exotic poppy, viz. as supermeconate of morphine.

PREPARATIONS OF EXOTIC MORPHINE.

M. Robiquet employs the following method. He boils a highly concentrated solution of opium with magnesia, in the proportion of 10 *grammes* to the pound of opium, for a quarter of an hour; whereby an abundant grayish deposite is formed, which is filtered, and washed with cold water. The precipitate being well dried, is treated with diluted alcohol, which is allowed to macerate for some time at a degree of heat below ebullition. In this way, a considerable quantity of colouring matter is taken up, but very little morphine. He again filters, and washes with a little cold alcohol. The deposite is once more taken up by a sufficient quantity of rectified spirit, which is well boiled, and, while in this state, the liquor is filtered a third time, which, upon cooling, yields morphine that may be divested of the colouring matter by repeated crystallization.

Another method of obtaining morphine in a state of purity is announced by Dr. Thompson.* He precipitates a strong infusion of opium by means of caustic ammonia, filters and evaporates the liquid down to a sixth part of its bulk; to this he again adds ammonia, and obtains a fresh precipitate of pure morphine. He allows it to subside, receives it on the filter, and washes it with cold water. When well drained he sprinkles it with a little alcohol, and passes the spirituous liquor through a filter, which carries with it a large portion of the colouring matter, and also a small quantity of morphine. He then dissolves the morphine in acetic acid, and treats the solution with ivory-black. This mixture, being agitated frequently during twenty-four hours, is finally projected on the filter,

[* Annals of Philos. June, 1820.]

and passes through into the recipient vessels entirely colourless. He next applies ammonia, and the morphine is precipitated in the form of a white powder. If this body be then dissolved in alcohol, and allowed to evaporate spontaneously, the morphine will be found in fine, regular, white crystals, of a slight opaline transparency, entirely without smell, but intensely bitter, and consisting of four-sided rectangular prisms.

We shall now give the results of three analyses of this substance, as made by MM. Bussy, of the School of Pharmacy, Dumas and Pelletier, and Mr. Brande.*

Morphine consists,

ACCORDING TO

Bussy,		Dumas and Pelletier,		Brande,	
Of Carbon.....	69.	Carbon.....	72.02	Carbon.....	72.
Hydrogen....	6.5	Hydrogen....	7.61	Hydrogen.....	5.5
Azote.....	4.5	Azote.....	5.53	Azote.....	5.5
Oxygen.....	20.	Oxygen.....	14.84	Oxygen.....	17.
Morphine	100		100		100

The second of these analyses was performed upon two specimens of morphine, the one obtained in the manner of Robiquet, and the other from the sulphate of morphine by means of potass.

ACTION OF MORPHINE ON THE ANIMAL SYSTEM.

There is no doubt (notwithstanding the difficulty of observation arising from its sparing solubility) that morphine is the narcotic principle of opium. Direct experiments have sufficiently proved this: if, for example, we make use of a solution of this substance in oil, we perceive violent narcotic effects even in a small dose, such as a quarter or half a grain, but these are still more strongly marked, when the morphine is combined with acids, probably because its salts are more soluble than it is itself in an uncombined state.

M. Magendie has now, for ten years, made use of the

* Annals of Philos., April, 1824.

acetate, the sulphate, and hydro-chlorate (muriate) for medical purposes, and he has found that these salts possess all the good properties of opium without its inconveniences. He has discontinued the use of the muriate, from having found in the first instance that its claims were inferior to those of the acetate and sulphate.*

PREPARATION OF TEE ACETATE OF MORPHINE.

This salt may be formed by mixing the acid and the morphine directly in a capsule, and then gently evaporating to dryness. Being, from its extreme deliquescence, with difficulty crystallizable, this mode of preparation has been resorted to; but it may be obtained by dissolving the morphine in alcohol and filtering the solution, saturating the liquor with acetic acid, and reducing it to dryness by careful evaporation. The product of this method is not exactly acetate of morphine, but an acetate with excess of the base. This may be seen upon proceeding to dissolve it in water, when a portion will remain undissolved, which is in fact morphine not completely saturated with acid. The same may take place, however, with the perfectly neutral acetate; for the salt in question has the property of separating into two salts, on being exposed to the contact of water—the one having an excess of acid, and being soluble, the other having the base in excess, and being insoluble. This inconvenience, together with the difficulty of obtaining a perfectly neutral acetate, probably may render the sulphate preferable.

We may, however, obtain the acetate in a crystallized state—in order to accomplish which, when the morphine is dissolved in alcohol, and this is saturated with acetic acid, it is to be filtered and allowed to evaporate slowly in a capsule covered with gauze. The acetate of morphine will then deposite its crystals on the sides of the capsule, in a ramified form.

* Nouveau Journale de Médécine, Paris, 1818.

TO PREPARE THE SULPHATE.

Dissolve morphine in diluted sulphuric acid. This solution, made warm, and evaporated to a certain point, will crystallize, upon cooling, into silk-like tufts. This salt may be confounded with sulphate of quinine, which it very much resembles. When heated, however, with concentrated nitric acid, it becomes red, a phenomenon not belonging to the sulphate of quinine.

It may also be obtained by dissolving morphine in alcohol, saturating with sulphuric acid, and evaporating. By this method also this salt is obtained crystallized in silky tufts.

As this salt when obtained is always the same, M. Pelletier conceives that it is preferable to the acetate, which frequently contains narcotine, a substance more soluble in alcohol than the morphine. The acetate undergoes partial decomposition also by the process of desiccation necessary for its conservation. As we always obtain the sulphate in a crystallized form, we never get a subsulphate, as is the case sometimes with regard to the acetate obtained by evaporation.

The sulphate of morphine is soluble in twice its weight of distilled water, and is composed of

Acid	22—5.00
Morphine	40—9.09
Water	38
	100

ADMINISTRATION OF THE SALTS OF MORPHINE.

SYRUP OF THE ACETATE OF MORPHINE.

Take of Simple syrup.....1 livre.
Acetate of morphine.....4 grains.
Make a syrup.

This syrup of morphine is now generally employed at Paris, in preference to the syrupus papaveris, the dose five *grammes** every three hours. Sleep is often procured by a single dose, taken in a little warm water on going to bed.

* See the scale at the end of the preface.

SYRUP OF THE SULPHATE OF MORPHINE.

Take of Simple syrup..... 1 livre.
Sulphate of morphine..... 4 grains.
Make a syrup.

The dose is the same as that of the syrup of the acetate of morphine.

M. Magendie employs this formula when the patient is habituated to the action of the former syrup. It may be remarked in general, that in varying these salts of the alkaline remedies, their action on the animal economy may be kept up for a very long time, without much increasing the dose.

SOLUTION OF MORPHINE.

Take of Acetate of morphine..... 16 grains.
Distilled water..... 1 once.
Acetic acid..... 3 or 4 drops.
Alcohol..... 1 gros.
Dissolve.

These two last are added to maintain the salt in solution.

This preparation is a good substitute for tinctures of opium in general. The dose is from 6 to 24 drops.

The sulphate of morphine may be employed instead of the acetate, for the purpose of making the solution.

These salts may be given in pills, electuaries, or draughts, in quantity from a quarter of a grain to 2 or 3 grains in the twenty-four hours.

M. Magendie has pushed it to four grains per diem, without any unpleasant consequences. This is by no means the active substance it was at first supposed, and not a very subtile poison; there can now be no doubt, that, in order to produce deleterious effects, it must be given in considerable quantity. It seldom produces vomiting.

SOLUTION OF THE CITRATE.

The black drop has been long employed, particularly in England and North America. In whatever manner the preparations were made, they all resolved themselves into a combination of opium with some vegetable acid, generally

in an impure state. Those most commonly used were the citric and the acetic, combined with aromatics and sweet substances. The advantages ascribed by medical practitioners to these drops were, that they did not irritate the stomach; nor excite headache, vertigo, nausea, &c.: that, in short, they were free from the exciting properties of opium.

Dr. Porter, of Bristol, (United States,) has improved upon the black drop, by a preparation which he calls Liquor of the Citrate of Morphine, which is made in the following manner:

℞. Opium..... ℥iv
Crystals of citric acid..... ℥ij

Pound them well in a porcelain mortar: then add a pint of boiling distilled water; mix the whole well together, macerate for twenty-four-hours, and, finally, filter.*

Although this has been termed a citrate of morphine, it, in fact, contains narcotine also. In forming it, pure morphine, or the extract of opium deprived of its narcotine, should be employed. The American physicians have used Porter's preparation with advantage: and they say its effect is more prompt, but less permanent than that of opium, either in substance or in tincture. One part of the liquor of the citrate of morphine is equivalent to about three or four of opium, in those cases in which a small quantity is sufficient to produce the desired effect; but where large doses are required, a double effect only is to be calculated on. Lime-water, solution of ammonia, and all alkaline carbonates are incompatible with this preparation, on account of the excess of acid which is constantly present.

The liquor of the tartrate of morphine possesses the same advantages as that of the citrate; and this latter generally produces its narcotic effects in the course of ten minutes. Some physicians have thought that it does not answer so well in dysenteric cases as other preparations of opium.

The following method of preparing the solution of the citrate of morphine, may be substituted for Dr. Porter's.

* Monthly Journal of Med. New-York.

Take of	Pure morphine.....	16 grains.
	Crystals of citric acid.....	8 grains.
	Distilled water.....	1 once.
	Tincture of cochineal.....	q. s.

Dissolve.

This solution is to be administered in drops from 6 to 24 in the twenty-four hours.

EXTRACT OF OPIUM DEPRIVED OF MORPHINE.

The process already pointed out under the article Morphine, does not entirely free the opium from this alkali; a certain quantity always remains in the residuum. M. Magendie, on having his attention drawn to this fact, applied himself to turn this residuum to account, though in general it had been considered useless. He had remarked that this substance still possessed a decided, though a feeble degree of narcotic power.

The extract may be given by grains, though four do not appear equivalent to one of the common watery extract, or to $\frac{1}{4}$ of a grain of morphine.

NARCOTINE, OR MATIERE DE DEROSNE.

M. Magendie does not consider the medical powers of this substance to be yet ascertained. It is one of the immediate principles of opium, and exists in the indigenous poppy; but at present very little is known respecting it.

ACTION OF NARCOTINE ON THE ANIMAL SYSTEM.

Given to the amount of a grain (dissolved in oil), it produces, upon dogs, a degree of stupor, which inexperienced persons may very readily mistake for sleep; although it is quite a different state—the eyes remaining open, respiration not being so profound as during sleep, and it being impossible to rouse the animal from this dull and stupid condition. Death commonly supervenes in twenty-four hours.

Combined with acetic acid, its effects are entirely different: animals can bear, in this mode, large doses (even

24 grains) without fatal consequences ; and while under its influence they are affected with symptoms similar to those induced by camphor—such as signs of fright, backward movements, incapacity of advancing forwards, froth at the mouth, agitation of the jaws, &c.

In combining the action of morphine with that of narcotine, our author has observed, that the distinct powers of each were exerted on the same animal at one and the same time.

M. Magendie introduced into the pleura of a dog a grain of morphine and a grain of narcotine, which were dissolved in acetic acid ; the animal soon became drowsy, with intervals of real sleep, from the morphine ; but at the same time the stimulating effects of the narcotine were evident, and appeared to contend with the effects of the morphine in a very singular and remarkable manner. This contention lasted more than half an hour, at length the animal fell into a profound sleep, probably from the sole influence of the morphine. Those who take morphine escape the unpleasant sensations of excitement which the watery extract of opium produces.

According to MM. Dumas and Pelletier, narcotine consists of

Carbon	68.88
Azote	7.21
Hydrogen	5.91
Oxygen	18.00
Narcotine	100.

EXTRACT OF OPIUM DEPRIVED OF NARCOTINE.

Experience has proved that narcotine is injurious if not combined with an acid, and that it becomes very exciting when thus combined. M. Robiquet entertained the idea of preparing an extract of opium, entirely freed from this principle, possessing a marked advantage over the common watery extract. For this purpose the watery extract is to be treated with ether, by means of which the whole of the narcotine is taken up. Truth compels us, however, to acknowledge that many years before M. Robiquet's

time, a watery extract of opium, purified by ether, was prepared by M. Limousin-Lamotte.

MODE OF PREPARATION.

Macerate crude opium in cold water, filter, and evaporate to the consistence of a thick syrup ; treat it in a convenient vessel with rectified ether, and agitate it frequently before decanting the etherial tincture. Having separated it, get rid of the ether by distillation. Repeat this operation till the residuum consists of crystals of narcotine. When the ether ceases to act, evaporate the solution of opium to the consistence of a pilular mass.

M. Dublanc, junior, thus modifies the foregoing process of M. Robiquet.

Take 300 *grammes** of extract of opium, prepared in the cold, and dissolve them in 150 *grammes* of distilled water. This solution is to be poured into a retort, and 2000 *grammes* of pure ether to be poured upon it. The apparatus is to be arranged so as to obtain the product of distillation and to be heated gradually. Having drawn off about 500 *grammes* of ether, the apparatus is to be removed, and the ether, supernatant on the extract, to be quickly decanted from the retort. The ether given over during the distillation will answer for washing the yet warm extract, after which evaporation to a proper consistence is to be conducted. Lest the ether decanted after the distillation should leave a small quantity of narcotine in the mass, this is to be dissolved in distilled water, and upon filtering, small crystals of narcotine mixed with an extractive purverulent matter will be found on the filter—insoluble in the small quantity of water employed to take up the extract. We are then to evaporate, in order that the extract may resume its ordinary form. In this way the extract of opium may be considered as completely deprived of narcotine. It has a strong affinity for the humidity of the atmosphere ; is readily soluble in water, which it does not colour nearly so deep as the common extract, nor

* See scale in Translator's Preface.

does it deposite any foreign substance. A digester may also be used for the purpose of obtaining the extract of pure opium by means of ether.

ACTION ON THE ANIMAL SYSTEM.

It is employed in the same manner as the watery extract of opium. Tried upon animals, it appeared to exert freely a narcotic power, and to have an effect exactly like that of morphine, but less powerful. M. Magendie has also employed it with advantage in practice, particularly on a young Greek physician, who suffered inconvenience from the common extract. This new preparation will in all probability be found an acquisition.

EMETINE.

MM. Pelletier and Magendie presented a Memoir to the Academie des Sciences in 1817, in which it was announced, as the result of a course of experiments, that the power of various species of ipecacuanha depended on a peculiar principle denominated emetine; and that this substance, being much more active than the ipecacuanha itself, without possessing either its disagreeable taste or nauseous smell, might, upon all occasions, be substituted for it with advantage. The smell of the ipecacuanha resides in a greasy substance, perfectly distinct from its emetic virtue; for M. Caventou swallowed it with impunity to the extent of six grains. M. Boulay has found emetine also in the viola odorata, and has named it violine or indigenous emetine.

PREPARATION OF COLOURED EMETINE.

Reduce ipecacuanha to powder, and digest it in ether at 60°, to dissolve the fatty odorous matter. When the powder yields nothing more to the ether, exhaust it again by means of alcohol. Place the alcoholic tinctures in a water-bath and redissolve the residue in cold water. It thus loses a portion of wax and a little of the fatty matter which

still remained. It is only necessary farther to macerate it on carbonate of magnesia, by which it loses its gallic acid, to redissolve it in alcohol, and to evaporate it to dryness.

But pure emetine is not obtainable in this way, although it may serve medical purposes. (See the next article.) It presents itself in the form of transparent scales, of a reddish brown colour, having scarcely any smell, but a bitter though not disagreeable taste. It supports a temperature equal to that of boiling water, without any change: it is highly deliquescent, soluble in water, and uncrystallizable.

ACTION OF EMETINE ON THE ANIMAL SYSTEM.

This substance, given to dogs and cats, to the extent of from half a grain to two or three grains, produced vomiting, followed sometimes by long protracted sleep; but when given to a greater extent, such as ten grains, it produced upon dogs repeated vomiting, accompanied by stupor, in which the animal, instead of recovering, as in the other case, commonly died in the course of twenty-four hours. On opening the body, the cause of death was discovered to be a violent inflammation of the pulmonary tissue, and of the mucous membrane of the intestinal canal, from the cardia to the anus—phenomena very analogous to those described by our author, in a separate memoir on the action of tartar emetic. The same effects are produced whether the emetine be injected into the jugular vein, or simply absorbed from any part of the body.

Two grains, taken on an empty stomach, gave rise to protracted vomiting, followed by a marked disposition to sleep. Sometimes a quarter of a grain will be sufficient to excite nausea and vomiting. In cases of disease the action of this substance is perfectly analogous, it both vomits and purges; but acts beneficially in catarrhal affections, particularly those of a chronic kind.*

* See Recherches Chimiques et Physiologiques sur l'Ipecac. Par MM. Magendie et Pelletier. Paris, 1817.

MEDICINAL EMPLOYMENT.

The cases in which emetine may be given are the same as those in which ipecacuanha is indicated.

To procure vomiting, dissolve four grains, and give it in divided doses. If the whole quantity were administered together, the vomiting thereby excited would expel it at once from the stomach, without producing any other effect. The following formula may be used.

EMETINE MIXTURE.

Take of	Emetine	4 grains.
	Weak orange-flower infusion	2 onces.
	Syrup of orange-flower	½ once.

Mix.

Five *gros* to be taken every half hour.

In chronic pulmonary catarrhs, hooping-cough, obstinate diarrhœas, &c. the following lozenges may be advantageously substituted for the common ipecacuanha preparations of that sort.

PECTORAL LOZENGES OF EMETINE.

Take of	Sugar	4 onces.
	Coloured emetine	32 grains.

Mix.

To be made into lozenges of nine grains each. It is customary to give these lozenges a rose colour, by means of a little carmine, in order to distinguish them from similar preparations of ipecacuanha. One may be given every hour; but more frequent exhibition will excite nausea. To excite vomiting by means of similar lozenges, half the quantity of sugar only should be used, and the proportion of emetine being the same, the lozenges should consist of 18 grains. One of these, taken fasting, is commonly an emetic for a child, and three or four will readily excite vomiting in adults.

The following syrup may be substituted for the syrup of ipecacuanha used in France.

Take of	Simple syrup	1 livre.
	Colouring emetine	16 grains.

Make a syrup.

PURE EMETINE.

The emetine of which we have hitherto spoken, is by no means pure. M. Pelletier, during a course of chemical research, upon which he is still employed, has obtained the active matter of the ipecacuanhas in a completely isolated state; and it appears to be a new vegetable alkali—of which we proceed to describe the principal characters.

MODE OF PREPARATION.

To obtain pure emetine, calcined magnesia must be employed, adding a quantity of this base sufficient to take up the free acid which exists in the liquor, and also to attract that which is combined with the emetine. This substance, being thus separated and rendered less soluble, is precipitated and mixed with the excess of magnesia; and the precipitate, washed with a little very cold water, (which takes up the colouring matter not combined with the magnesia,) must be carefully dried, and treated with alcohol, which dissolves the emetine. This being again obtained, (after evaporating the alcohol,) must be redissolved in diluted acid, and treated with purified animal charcoal. After this process, for the purpose of removing the colour, we are to precipitate by means of a salifiable base. The waters in which the magnesian precipitate has been washed, still retain a portion of emetine, which may be obtained by another series of operations.

M. Calloud obtains emetine by the following process: 125 *grammes* of the cortical part of ipecacuanha pulverized, is mixed with 800 *grammes* of water, sharpened by 16 grains of sulphuric acid; it is brought to the boiling point and kept a little below that temperature for half an hour, stirring it constantly with a wooden spatula; then it is all poured upon a shallow earthen dish so as to extend the surface as much as possible.

This acidulated decoction is left to cool, and to it is added 125 *grammes* of pulverized lime, it is then reduced to the consistence of jelly by the addition of a sufficient quantity

of water, and afterward dried upon a stove at a temperature not above 50° Reaumur.

This mass is then pulverized, it is composed of sulphate of lime, gallate of lime, fatty and colouring matter combined with an excess of lime, free emetine, fecula, and woody matter. On submitting this to the action of boiling alcohol at 36° or 38°, the emetine is dissolved, combined with very little foreign matter ; and is obtained by evaporating the alcohol.

To procure this substance in a pure and white state, dissolve it in water slightly acidulated, treat it by very pure animal charcoal, filter the solution, that it may be more conveniently concentrated ; saturate the acid with weak ammonia, filter, wash with a little distilled water, and leave what remains upon the filter to dry at the ordinary temperature, and in the dark : this will be pure emetine.

Emetine may be procured from the mother waters and washings, according to the methods already described.

PHYSICAL AND CHEMICAL PROPERTIES.

Pure emetine is white and pulverulent, not acted on by the air ; whereas coloured emetine is deliquescent. This substance is slightly soluble in cold water, rather more so in warm water, but readily so in ether and alcohol. Its taste is slightly bitter. It is very fusible, melting at 50° of the centigrade. It restores the blue colour to turnsol reddened by an acid ; and dissolves in all the acids, impairing, without entirely removing, their acidity ; and forming with them crystallizable salts, in which the acid predominates. It is precipitated from its combinations by gallnuts, in the manner of the alkalies of cinchona, so that in a case of poisoning by emetine, gallnuts would be the only antidote. M. Caventou swallowed a dose which produced inconvenient consequences, but neutralized its action by a decoction of galls. According to MM. Dumas and Pelletier the composition of this substance is :—

Carbon	64.57
Azote	4.00
Hydrogen	7.77
Oxygen	22.95
Emetine	99.29

This emetine was obtained from the cæphalis emetica.

ACTION OF PURE EMETINE ON THE ANIMAL SYSTEM.

It is the same as that of the coloured, but much more powerful. Two grains are sufficient to kill a large dog. M. Magendie saw vomiting produced by one-sixteenth of a grain in a man aged 85, in whom, however, vomiting was easily excited.

MEDICINAL EMPLOYMENT.

For some time M. Magendie has used lozenges, composed of

Sugar	4 onces.
Pure emetine	8 grains.

made into lozenges of 9 grains each.

But in order to produce vomiting, one grain of pure emetine, previously dissolved either in a little acetic or sulphuric acid, may be mixed in some drink; or the following formula may be adopted:

EMETIC MIXTURE OF PURE EMETINE.

Take of	Infusion of lime-flowers	3 onces.
	Pure emetine dissolved in a sufficient quantity of acetic acid	1 grain.
	Syrup of marshmallow	1 once.

Mix.

Dose. Five *gros* every quarter of an hour till vomiting is produced.

Or, a syrup may be prepared in the following manner.

Take of	Simple syrup	1 livre
	Pure emetine	4 grains.

ake a syrup.

which may be given in doses of 5 grammes.

ALKALIES OBTAINED FROM CINCHONA BARK.

Several authors,* a few years ago, published, interesting inquiries on the different varieties of cinchona, but were by

* MM. Laubert Rheuss of Moscow, and Gomez of Lisbon.

no means agreed as to the principle in which the febrifuge property resided. MM. Pelletier and Caventou, persuaded that such a principle did exist, pursued the method for its detection which had so happily succeeded in regard to strychnine, &c., and finally discovered it to be that which had been already described by M. Gomez, of Lisbon, under the name of cinchonin, although they were the first to discover its alkaline character.

It was in the course of their experiments upon the gray bark (cinchona condaminea) that they obtained the cinchonine, which it was judged convenient to name thus, in order to assimilate it in this respect to the other vegetable alkalies: while the yellow bark (cinchona cordifolia) furnished an alkali, which, though in many respects resembling the other, differed in certain properties, too remarkable to admit of their being confounded: this latter they denominated quinine.

The analysis of the red bark (cinchona oblongifolia) was next undertaken; and, as it was generally considered the most powerful febrifuge, it became a matter of some importance to ascertain whether its virtues resided in cinchonine, quinine, or a third alkaline principle. Cinchonine was obtained in every respect resembling that of the gray bark, but in three times the quantity; and about double the quantity of quinine was procured as from an equal portion of yellow bark: besides which, the quinine yielded by this variety (with some shades of difference in regard to its fusibility, and the appearance of the sulphate) possessed the same characters as the other. Farther investigations made upon large quantities of bark, showed that both quinine and cinchonine resided in all these three species of cinchona; but that in the gray kind the proportion of the cinchonine to that of the quinine was much larger. The reverse is the case in the yellow bark—the quinine being there so predominant, that it is not astonishing that the other should be overlooked, when examining small quantities.*

* Dr. Michaelis, of Magdeburg, has analyzed the different species of cinchona, and determined the proportions of these two substances in the following manner:

PREPARATION OF CINCHONINE AND QUININE.

The cinchonine is first deprived entirely of its bitterness by means of alcohol; and distillation is then to be performed in a water-bath, to dryness. The alcoholic extract is to be entirely dissolved in boiling water, strongly impregnated with hydrochloric acid. A large portion of calcined magnesia is then to be added, in order to fix the red colouring matter, and clarify the liquor, which will be accomplished by a few minutes' ebullition. It is then allowed to cool, thrown on a filter, and the magnesian precipitate washed with cold water. It is next to be dried upon a stove, and afterward repeatedly treated with boiling alcohol, until the bitterness be entirely removed. The alcoholic liquids are now to be collected, and the cinchonine crystallized by cooling. The cinchonine obtained in this manner is still adulterated by the fat green matter, which is to be separated by solution in a highly diluted acid; for were the acid too concentrated, part of the fatty matter would be dissolved, and the object baffled.

Quinine is obtained from the yellow bark in the same manner as cinchonine from the gray; and as they both exist in the three species of bark, we may obtain them by a single process in the following manner.

Having first obtained the sulphate of quinine, (by the process to be described hereafter,) the mother-waters, and those which result from the washing, are to be mixed—for these latter contain the sulphate of cinchonine. Till the present time, it was supposed to be sulphate of quinine,

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	Cinch.	Quin.	Total.
China rubra (oblongifolia)	gr. 32	64	96
—— loxa	18	8	26
—— fusca	—	75	75
—— —— Huanuco (Havana)	50	32	82
—— —— Superf. huanuco	74	28	102
—— —— Superf. huamalies	—	12	12
—— —— Huamalies	48	28	76
—— —— —— infer.	60	34	94
—— —— Tenn. superf.	12	44	56
—— —— —— medior	12	80	92
—— flava Carthagena	28		76
—— Regia roule	—	154	154
—— —— in fragments, united	—	236	286

rendered uncrystallizable by the yellow matter and a portion of the fatty matter, which (it is true) are found in these liquids. Having obtained these waters, they are decomposed by magnesia or lime. The precipitate being washed and well dried, is treated with boiling alcohol, which dissolves the quinine and the cinchonine ; but here this latter substance (predominating) crystallizes, at least if the liquor is sufficiently charged with it : failing this, it must be a little concentrated, and the cinchonine, thus obtained, must be purified by crystallization. In order to effect this, let it be dissolved in a sufficient quantity of boiling alcohol, and it will thus be obtained very pure. The mother waters contain quinine, which may be separated by evaporation.

In a work recently published by MM. Henry, jun., and Plisson, these chemists state that they have obtained immediately from the barks the quinates of quinine and of cinchonine ; they also make it appear very probable, that in the cinchona one part of the alkaline febrifuges is combined with the red colouring matter of Rheuss.

MODE OF PREPARING QUINATES OF QUININE AND CINCHONINE.

MM. Henry and Plisson have obtained these salts in the following manner :—they treat with cold water the produce of the aqueous decoction of the yellow or gray bark, reduced to the consistence of syrup. To the clear liquor they add hydrate of lead, until it is saturated and colourless, then filter it, and deprive it of the metallic oxide by means of a current of hydrosulphuric acid gas ; the new liquid being filtered, they saturate with chalk, then reduce it to the consistence of syrup, and treat it repeatedly by alcohol : the alcoholic liquors are submitted to spontaneous evaporation. These quinates crystallize very visibly in an irregular form.

The combination of the red matter of Rheuss with the alkaline febrifuges is almost insoluble in water, but soluble in weak acids by heat, without being sensibly decomposed ; in cooling, it precipitates as a reddish powder. Alcohol

readily dissolves it; and the alcoholic tincture, treated by water, allows it to deposite in red, orange, or bluish flakes.

The alkalies decompose this combination by uniting with the colouring matter, and setting the alkaloid at liberty.

CHEMICAL PROPERTIES OF CINCHONINE.

It is white, transparent, crystallizable in the form of needles, but soluble only in 700 parts of cold water; whence its weak taste. Dissolved in alcohol, and still more if dissolved in an acid, its taste is very bitter, exactly resembling that of the gray bark. It is but slightly soluble in fixed and volatile oils, and sulphuric ether; but, united with acids, it forms salts with them which are more or less soluble. At a certain temperature, it volatilizes; and though the greater part of it is destroyed by this operation, a sensible portion escapes this decomposing action of heat.

Both the sulphate and acetate of cinchonine are employed in medicine; the first of these salts is very soluble in water, the second much less so; but an excess of acid dissolves it readily.

CHEMICAL PROPERTIES OF QUININE.

This substance is white; and although it did not appear to be crystallizable by solution, MM. Dumas and Pelletier succeeded in making it assume the crystalline form, by submitting it to igneous fusion, in vacuo, and suffering it to cool slowly. When this is effected, instead of retaining its resinous and transparent appearance, it contracts, becomes opaque, and on the surface there are formed centres of crystallization, which, radiating in all directions, produce a sort of undulated appearance. The fracture of the mass is crystalline. M. Pelletier has more recently succeeded in crystallizing quinine in the form of silky flexible tufts, by leaving a very pure alcoholic solution undisturbed.* It is equally insoluble in water as cinchonine, but its taste is much more bitter. Its salts are in

* Journal de Pharm. June, 1825.

general more so ; and they are distinguished by a pearly appearance. Quinine is highly soluble in ether, while cinchonine is slightly so ; by which we have not a mark of distinction only between these principles, but the means of separating them when found united. Quinine, when fused, becomes idio-electric, and attracts resinous electricity with great intensity, when rubbed with a piece of cloth.

The mean composition of quinine, as obtained by MM. Dumas and Pelletier, is the following,

Carbon	75.38
Azote	8.72
Hydrogen	6.15
Oxygen	9.85
	100.10

According to Mr. Brande, it consists of

Carbon	73.80
Azote	13.00
Hydrogen	7.65
Oxygen	5.35
	100--near.

The same chemists have ascertained the composition of cinchonine to be

Carbon	76.97
Azote	9.02
Hydrogen	6.92
Oxygen	7.97
	100.18

An analysis made by Mr. Brande, however, gives a very different result ; viz—

Carbon	79.30
Azote	13.72
Hydrogen	7.17
	100.19

PREPARATION OF THE SULPHATE OF QUININE.

A ready and cheap mode of obtaining this salt direct, has been made known by M. Henry, jun.* He treats the bark several times, (exposed to heat,) with water sharpened by sulphuric acid (in the proportion of 6 or 8 *grammes* to the *kilogramme* of distilled water) ; filters through close linen,

* Annals of Philos. April, 1824.

blanches the liquids by means of quick-lime, and washes the precipitate, in order to get rid of the excess of lime. This being well drained, is digested repeatedly with alcohol at 36°. The spirituous tinctures are collected in an alembic, and placed in a water-bath. The alcohol is now obtained by distillation, and will answer for future operations: and the residue consists of a brown, viscid, bitter substance, which contains a considerable proportion of impure quinine. This mass is exposed to heat, with water impregnated with sulphuric acid, is passed through filtering paper, and the liquid when cool yields crystals of sulphate of quinine, which a second solution and crystallization furnish perfectly pure. The same method, but without the same success, has been tried for the extraction of sulphate of cinchonine from the gray bark.

Sulphate of quinine, obtained thus, presents itself in the form of white crystals, perfectly soluble in water, but still more so in boiling water, particularly if it be a little acidulated. Exposed to a temperature of 100°, it becomes luminous, especially if submitted to slight friction. MM. Dumas and Pelletier have tried the experiment on two or three ounces of it, contained in a glass flask, and kept at the temperature of boiling water, in a water-bath, for half an hour. It then gave out, by friction, an intense white light. Upon introducing, through the cork of the flask, a metallic rod pointed at the interior extremity, and with a ball at the other, these gentlemen by applying to this round extremity the knob of the electroscope of Volta, and shaking the flask before each application, obtained the utmost possible repulsion among the straws composing the electroscope: the electricity being always of the vitreous sort. The sulphate of cinchonine possesses the same phosphorescent and electric properties, but in a minor degree.

Messrs. Pelletier and Caventou have laid down the inference that pure water is incapable of extracting all the quinine and cinchonine contained in the bark. M. Guerette, apothecary in chief at the hospital of Toulouse, instituted some new experiments on the subject, and found that the barks, which, after being subjected to decoction in this manner, were thrown away as useless, might still fur-

nish nearly two-thirds of the quinine and cinchonine they contained in the virgin state. Consequently, the residue of bark acted on by water should be preserved, in order that upon occasion they may furnish febrifuge salts.

PREPARATION OF THE SUPERSULPHATE OF QUININE.

M. Robiquet, by pursuing a somewhat different method, obtained a sulphate possessed of characters not quite the same as those we have described. It exists transparent, in solid prisms, of a flattened quadrangular form, distinctly terminated, and soluble even in the cold. Desirous of ascertaining the source of this difference, he submitted the two sulphates to a comparative examination, and ascertained that the solution of the prismatic sulphate was acidulous, while the other was alkaline. He satisfied himself as to the stability of these characters ; for the salts retained them unchanged after repeated crystallizations, the subsulphate, however, continuing to lose a little of its acid each time. Besides which, M. Robiquet ascertained that if he constantly obtained the supersulphate it was owing to this circumstance,—that in treating the quinine with water he could not dissolve it, excepting by means of a slight excess of acid, whereas, if alcohol be employed, (as the quinine is soluble in this menstruum,) no more acid need be added than is necessary for saturation.

COMPARATIVE ANALYSIS OF THE TWO SULPHATES OF QUININE.

M. Robiquet, observing that upon each crystallization the sulsulphate lost a portion of its acid, thought it proper to make known the composition of this salt, both after the first and after the third crystallization.

100 parts of super s. of q. contain	Acid	19.1	82.6
	Quin.	63.5	
——— subsulph. 1st crystal.....	Acid	11.3	90.3
	Quin.	79.0	
——— 3d crystal...	Acid	10.0	90.9
	Quin.	80.9	

It is probable, however, that M. Robiquet did not obtain this subsulphate in a very pure state; for we know from the subsequent researches of other chemists that what he calls subsulphate of quinine is constant in its proportions, at least in its hydrated form. The common sulphate of quinine is considered by M. Baup* to be neutral salt; and he considers also very properly that this efflorescent preparation is the best for therapeutical purposes, on account of its uniform composition. If it be kept in a humid situation it can never contain more than 76 per cent. of quinine; whereas if it be retained in a dry place and enclosed in a badly stopped bottle, it may consist of 86 per cent. According to Baup the dry supersulphate contains

Acid ..	18.181	100 000 supersulphate.
Quinine	81.819	
Acid ..	10.000	100.000 neutral sulphate.
Quinine	90.000	
Acid ..	9.57	100 neutral invariable sulph. efflorescent.
Quinine	86.12	
Water	4.31	

To obtain this last salt the ordinary sulphate must be freely exposed to the air of a temperature of 20°. Four-and-twenty hours will be sufficient to produce the effect, which will not be increased by longer exposure.

ACETATE OF QUININE.

This is remarkable for the great facility with which it crystallizes. It is slightly soluble in the cold, even when excess of acid is employed.

CITRATE OF QUININE.

M. Caventou has lately prepared citrate of quinine; citric acid, with the assistance of heat, dissolves quinine with facility; this solution is transparent, but it becomes solid by cooling. This is, perhaps, of all the salts of quinine, that which most resembles the sulphate in form: it may exist in the state of supercitrate of quinine, which may

* Annal. de Phys. et de Chim. tom. xxvii, Novembre, 1824.

sometimes be employed, when it is desirable to combine a tonic with an antiseptic remedy.

ACTION ON ANIMALS.

Scarcely were these alkaline bodies discovered, when M. Pelletier furnished our author with a certain quantity, for the purpose of observing their effects upon animals. M. Magendie at once perceived that they possessed no poisonous properties, and indeed manifested no immediate action whatever—whence it was inferred that their effects might with propriety be determined on the human system.

ACTION ON THE HUMAN SYSTEM IN HEALTH AND IN DISEASE.

Through the medium of a sufficient number of experiments, M. Magendie came to the conclusion that these two alkalies possessed the medical properties of cinchona, and might consequently be used as substitutes in all cases. Other physicians, more particularly MM. Double, Villerme, and Chomel, turned their attention to the same subject, and arrived at similar results.

In the treatment of diseases it is of the greatest importance to know the exact dose of every distinct substance which may be employed ; and in no case is this importance greater than in the present, as the quantity of these alkalies contained in the cinchonas varies excessively, according to the nature and the quality of the barks employed. To be able to administer the active principle of cinchona in so convenient a form is in some cases very important. Patients have often been lost in remittent fevers from the mere circumstance of their repugnance to take the necessary quantity of bark in powder ; others have rejected it by vomiting, while some have been seized with diarrhœa, so that the medicine did no more than pass through the intestinal canal without producing any benefit. Even under the most favourable circumstances the stomach of the patient must of necessity analyze the bark introduced into it, in order to separate the febrifuge principle. This,

however, is always a troublesome and tiresome operation, even for the most healthy stomach; so that chemistry has rendered a real service to medicine by effecting this result in advance.

In the course of his investigations with M. Pelletier, M. Caventou became acquainted with the effects of these substances; for being constantly obliged to taste the liquids containing them, he felt a general excitation similar to that which is uniformly produced by coffee. The analogy was sufficiently striking to induce both these gentlemen to institute an analysis of coffee, recommended in fevers by several physicians. In it they found neither quinine nor cinchonine, but a vegetable basis, readily crystallizable in long, white, silky filaments, resembling amianthus—upon which they did not think it necessary to prosecute their inquiry, as M. Robiquet had already made some progress in the investigation concerning this article—which he has since designated caffeine.

The employment of the sulphate of quinine is now become very general; and daily experience confirms its efficacy in all affections of an intermittent type.

All the proceedings of societies and all the medical journals now contain reports of intermittent fevers cured by means of this article. We shall more particularly allude to Dr. Elliotson of St. Thomas's Hospital, London, who has inserted a very interesting paper on the subject in the Medico-chirurgical Transactions.* In his experience the same results (as to intermittent fever) have been obtained from the pure quinine as from the sulphate. He has also given it in intermittent nervous attacks, and in typhus with advantage. The doses employed by this physician have been much larger than we have been accustomed to give; yet his success has been uniform. Pure quinine was administered by him, to the extent of five grains every six hours—and ten grains even, at similar intervals, have been given without any bad consequence.†

Dr. F. Barker of Dublin has recorded thirty cases of in-

* M. Magendie has misquoted Dr. E. Dr. Elliotson has just informed the translator that he has never given the sulphate of quinine in doses of ten grains every six hours, and that he has never given more than five grains every four hours.

† Vol. xii. part 2, for 1824.

termittent fever of various types* which were all cured by the sulphate of quinine. He commonly gave from one to three grains three times a day, rarely exceeding this quantity. Six, eight, or ten grains were often sufficient to prevent the return of fever. In some cases, however, the quantity taken was from 24 to 30, and in one instance even 44. In the same collection Dr. O'Brien reports six cases of typhus, in which the sulphate of quinine was given from three to four grains daily, two were as promptly cured as if the disease had been an intermittent; in three others the result was equally fortunate, though less prompt: the sixth died. M. Magendie relates that he has seen Dr. Elliotson give large doses of sulphate of quinine with impunity in erysipelas. Other physicians have proved the benefit of sulphate of quinine in many cases of intermittent and typhus fevers.

Nor have the powers of this medicine failed in fevers of the remittent type. M. Magendie reported in his own journal,† the first cases of this description in which cures have been obtained by the sulphate of quinine. M. Renauldin communicated the first fact of this nature, and shortly after Magendie himself had an opportunity of administering the same medicine with success. Nor can there now be the least doubt either as to the utility of this alkali, or the distinguished properties it possesses (together with its salts) above all the other preparations of bark. In subsequent numbers of the same journal will be found interesting cases of neuralgia cured by the same medicine; and since then its efficacy in similar cases has been still farther confirmed.

Dr. Klokow reports‡ the case of a woman aged fifty, in which a profuse and dangerous hemorrhoidal discharge was arrested by means of sulphate of quinine. He gave four grains at once, and the flux was stopped at the second dose, the mineral acids, alum, ipecacuanha, and opium having been employed in vain.

Dr. Goupil, in the case of a man aged twenty-eight,

* Transactions of the Dublin Association of Fellows and Licentiates of the King's and Queen's College of Physicians in Ireland. *Dublin*, 1824.

† In his Journal de Physiol. July, 1821.

‡ Journal der practischen Heil kunde. Juin, 1824.

affected with a severe pectoral disorder accompanied with intermittent hæmoptysis, administered eighteen grains of the sulphate of quinine in the course of twenty-four hours, with the effect of curing him, having applied fifteen leeches to the anus two days before.*

M. L. Martinet has likewise published an account of the employment of the sulphate of quinine in the intermittent fevers of Italy. According to him, this substance had no effect till given to the extent of from 20 to 24 grains for a dose in quotidians and quartans; but it produced no bad effects in the abdominal viscera, and the disorders were cured.† M. Chomel has given it to the extent of 36 grains in one dose, with success.

Professor Mathœis,‡ in thirty-one cases of simple and double tertian, has effected cures, by giving the sulphate of quinine in doses of from 15 to 35 grains, in two or three days. This gentleman also reports two cases of remittent, the one cured by bark, and the other by the sulphate of quinine: M. Rossi treated 64 persons labouring under intermittents of different types and species, by means of sulphate of quinine: 8 tertians, 29 double tertians, 2 quartans, 27 subcontinued, and 8 remittents were cured. Fifty patients had no attack after the first dose; seven had them in a slight degree. The quantity administered varied from 12 to 72 grains, but in 24 cases it was not necessary to go beyond 24 grains. M. Toneli also relates that 65 cases of intermittent were cured, with the exception of one, which was in a hopeless state when the remedy was resorted to. Of these, 4 were quotidian; 22 tertian; 31 double tertian; 3 quartan; 2 double quartan; 2 subcontinued; and one remittent. Forty-two patients never had a return of the paroxysm, after the first dose. The quantity given to each varied from 12 to 18 grains.

MEDICINAL EMPLOYMENT OF CINCHONINE AND QUININE.

The preparations hitherto most commonly used have

* Nouv. Bill. Medic., Juillet, 1824.
† Revue Medicale. Mars, 1824.
‡ Giornale arcadico di Roma, Noumbre, 1822.

been the sulphates of quinine and cinchonine. Of the first the ordinary dose is from one to ten grains in the 24 hours; and those physicians who have materially exceeded this, have not in general met with the success they anticipated. In some cases, too, the patient has experienced unpleasant consequences, such as great agitation and very strong cerebral excitement. M. Magendie has never found it necessary to give more than 10 grains in the 24 hours, and has never seen this salt fail in its effect.

From the observations he has made for some years in the hospitals with which he has been connected, for the purpose of determining the exact dose of sulphate of quinine, he has found two grains in twenty-four hours were sufficient to stop a tertian, quartan, or quotidian fever. The want of success of other practitioners with these small doses has arisen doubtless from the impurity of the article.

Dr. Alphonse Menard, a physician of Lunel, who appears to have had frequent opportunities of treating intermittent fevers, has published a paper* on the inconveniences that result from large doses of sulphate of quinine in such cases. For the most part, it would seem that he has found 6 grains sufficient to arrest the course of the disease in adults. Of the bad effects adduced by this author, the evidence is by no means satisfactory; as a great number of natural or accidental circumstances may influence the course of the disease.

Dr. Ernert has published a very good thesis on the employment of those alkalies, entitled *De Medicamentis in febribus intermittentibus cortici peruviano substitutis. D. J. M. Auctor* Frid. Adam. Ernert. *Saxo-Boruss.* 1822.

Following M. Magendie's directions, M. Pelletier has prepared a perfectly colourless and transparent syrup of cinchona, which contains two grains of quinine per *once*. It daily affords the greatest satisfaction, and appears to our author to have a desirable effect in the scrofulous affections of children.

* Revue Medicale for November, 1823.

SYRUP OF QUININE.

Take of	Simple syrup	2 livres.
	Sulphate of quinine.....	64 grains.

Make a syrup.

Six doses of 5 *gros* each are commonly sufficient to arrest intermittents; and M. Magendie has seen a remittent yield to the same quantity.

QUININE WINE.

Take of	Good Madeira	1 livre.
	Sulphate of quinine	12 grains.

Mix.

Malaga or almost any wine may be employed.

TINCTURE OF QUININE.

Take of	Sulphate of quinine.....	6 grains.
	Alcohol at 34°	1 once.

Mix.

The sulphate is here preferable to pure quinine, because a tincture made with an alkali not saturated by an acid is decomposed by watery liquids. Quinine wine may be prepared extemporaneously with this tincture by adding two *onces* of it to the *pinte* of wine.

PREPARATIONS OF CINCHONINE.

This substance has also been employed, both as a febrifuge and as a tonic, more especially by Dr. Chomel; but although it must be allowed that it does possess both these properties, we find them in a less powerful degree than in the quinine; in some instances the febrifuge virtue has been wanting altogether. It is to be desired that medical men would turn their attention again to the virtues of this substance, which is united with quinine in almost all kinds of bark, and which is found also in the Carthagena variety.

M. P. Mariani, a physician at Mortura, a city of Milan-

has published an interesting memoir upon the use of the pure cinchonine, and of the sulphate in intermittent fevers. He considers the effect of this medicine to be as certain as that of the sulphate of quinine, and, in some respects, more convenient, being more easily soluble in water, and having less bitterness.

He asserts, that cinchonine, and even quinine, may be freed from bitterness, by repeatedly washing them with alcohol, and that the presence of a free acid is requisite to develope this sensation.

In the first part of this memoir, he gives thirty-seven cases of intermittent fevers, of various types and degrees of severity, all of which were cured by the sulphate of cinchonine.

In the second part of his work, he relates many cases which yielded to the pure cinchonine; these medicines were administered in peppermint-water; the first dose was always the largest; in one day he gave thirty grains of cinchonine in three doses: he sometimes begins with a dose of twenty grains.

In order to facilitate inquiries, M. Magendie has devised the following formulæ :—

SYRUP OF CINCHONINE.

Take of Simple syrup ..... 1 livre.
Sulphate of cinchonine.. 48 grains.
Make a syrup.

To be employed in the same doses, and in the same cases, as the syrup of quinine.

CINCHONINE WINE.

Take of Madeira wine..... 1 livre.
Sulphate of cinchonine 24 grains.
Mix.

TINCTURE OF CINCHONINE.

Take of Sulphate of cinchonine..... 12 grains.
Alcohol at 34° ..... 1 once.
Mix.

The wine of cinchonine may be formed extemporaneously, by adding two *ounces* of this tincture to the *pinte*.

MEDICINAL EMPLOYMENT OF SULPHATE OF QUININE IN COMBINATION WITH OTHER MEDICINES.

SULPHATE OF QUININE WITH OPIUM.

A great number of celebrated physicians have recommended opium to be combined with bark, in cases of obstinate intermittent fevers; Storck, Hofman, Rivière, Sydenham, and Lind have often employed this combination with success. This has been particularly recommended when the stomach has been too irritable to bear the cinchona alone; although this inconvenience has not been frequently observed, since the use of the sulphate of quinine has become general, nevertheless, there are circumstances in which it is useful to combine sulphate of quinine with opium, or rather with morphine. Intermittent fevers, which resisted the sulphate of quinine, have been cured by this method.

MEDICINAL EMPLOYMENT.

M. Sedillot* administers from fifteen to twenty grains of the sulphate of quinine combined with two or three grains of opium daily, divided into doses, and administered during intermissions; he continues to emply this medicine for eight days after the cessation of the paroxysms, gradually reducing the doses.

He has never seen intermittent fevers of any type, severity, or standing, resist the power of the opiated sulphate of quinine, unless the fevers were accompanied by organic lesion.

M. Magendie prefers combining the sulphate of morphine with the sulphate of quinine, according to the following formulæ—

Take of	Sulphate of quinine.....	2 to 6 grains.
	Sulphate of morphine.....	½ to 1 grain.
Mix.		

of which make from two to four doses.

* Journal Générale, tome 97, page 9.

We may also combine sulphuric acid immediately with the morphine and the quinine, bearing in mind the different quantities of these two bases required to saturate the sulphuric acid.

SULPHATE OF QUININE COMBINED WITH TARTARIZED ANTIMONY.

Dr. Dominique Gola has related four cases of intermittent fever, in which the sulphate of quinine administered alone* had failed, but which were afterward cured by the sulphate of the quinine in combination with tartarized antimony, in the following proportions.

Take of Tartarized antimony..... 3 grains.
Sulphate of quinine..... 10 grains.

Mix accurately, and divide into six equal parts, one of these parts was taken every two hours during the apyrexia; the first dose sometimes produces vomiting of a bitter fluid, sometimes alvine evacuations, sometimes no evacuation takes place, but the fever is always cured.

These combinations may in some cases be useful, but the sulphate of quinine will in most cases be sufficient alone.

VERATRINE.

We owe our knowledge of this substance also to MM. Pelletier and Caventou.† These indefatigable chemists had remarked, that in the veratrum tribe, almost all the individuals, besides the botanical characters, possessed a distinctive and very acrid taste, while they produced a similar action upon the animal economy,—they accordingly conceived that it would be interesting to ascertain whether such properties did not reside in some particular

* Annali Universali di Medicina, Juillet et Août 1825.

† In the German translation of this Formulary, the discovery of this substance is also ascribed to M. Meissner, who is described as procuring it in a different manner, viz. by infusing the seeds of sabadilla in alcohol of moderate strength, evaporating and precipitating the alkali with carbonate of potash, and afterward washing the product with distilled water.

substance, common to all these plants. Their conjectures were confirmed by an analysis of the seeds of the veratrum sabadilla; by which they separated the acrid principle, recognising in it all the alkaline properties. They afterward detected it in the bulb of the colchicum autumnale, in that of the veratrum commune, or white hellebore; and named it veratrine, from the family designation belonging to these plants.

MODE OF PREPARING VERATRINE.

The seeds of the sabadilla are to be treated repeatedly with boiling alcohol. These tinctures filter, while still nearly boiling; deposite, on cooling, whitish flakes of wax; the substance in solution reduced to the consistence of extract, is to be taken up again by cold water and refiltered there. There then remains upon the filter a small quantity of fatty matter; the solution is to be slowly evaporated. A precipitate is formed of an orange-yellow colour, which exhibits the characters of that colouring matter which is found in almost all woody vegetables. A solution of acetate of lead is now poured into this highly coloured liquid; and there forms immediately a new and very abundant yellow precipitate, which is separated by filtration. The liquor, now become nearly colourlsss, still contains, among other substances, acetate of lead, which has been added in excess. The lead is separated by means of a current of sulphuretted hydrogen gas; the liquor is then filtered and concentrated by evaporation, afterward treated by magnesia, and again filtered. The magnesian precipitate is next exposed to boiling alcohol; and the spirituous fluids being evaporated, yield a pulverulent substance, extremely acrid, and possessing all the alkaline properties. This substance is at first of a yellowish colour, but by repeated solutions in alcohol, and precipitations effected by pouring water into these solutions, we obtain it in the form of a very white and perfectly inodorous powder.

CHEMICAL PROPERTIES OF VERATRINE.

Veratrine is very slightly soluble in cold water. Boiling water dissolves $\frac{1}{1000}$ part of its weight, and acquires a sensible sharpness. It is readily soluble in ether, and still more so in alcohol. It is insoluble in the alkalies, but soluble in all the vegetable acids. It saturates all the acids, forming with them uncrystallizable salts, which by evaporation assume the appearance of gum. The supersulphate alone presents the rudiments of crystals. Nitric acid combines with veratrine; but if added in excess, especially when concentrated, it does not produce the red colour, as in the case with morphine, brucine, and strychnine when impure: it readily, however, alters the vegetable substance in its elements, and gives rise to the formation of a yellow detonating matter, analogous to Welther's bitter.

Veratrine restores the blue colour of turnsol paper reddened by acids: exposed to heat it liquefies at a temperature of 50°+0, and in this state presents the appearance of wax. On cooling it forms a mass, like amber, of a transparent hue. Distilled over an open fire, it swells up and decomposes, producing water, a great deal of oil, &c. It leaves a considerable quantity of carbonaceous matter behind it, which being burnt, deposites but an inconsiderable residue, slightly alkaline.

Three analyses have been made by MM. Dumas and Pelletier, of veratrine, obtained from sabadilla, the results of which do not materially differ.

Carbon	66.75
Azote	5.04
Hydrogen	8.54
Oxygen	19.60
	99.93

ACTION OF VERATRINE ON ANIMALS.

The experiments which have been instituted with the view of ascertaining the powers of this substance upon the animal system, have been made with the acetate only, which when injected in a very small quantity into the vas-

trils of a dog, instantly excites violent sneezing, which sometimes continues for half an hour. One or two grains thrown into the fauces, immediately cause profuse salivation, which also lasts some time. If the same quantity be thrown into any part of the alimentary canal, and the abdomen be opened for the purpose of observing the effects, the intestine violently contracts, then becomes relaxed, then again contracts, and so on for some time. The portion of the mucous membrane, in contact with the veratrine, inflames, the irritation spreads, and both vomiting and alvine dejections are excited. Administered to greater extent, the circulation and respiration are much accelerated, tetanus quickly supervenes, and terminates in death. The effects are still more rapid when the veratrine is injected into the pleura or the tunica vaginalis.

The same quantity thrown into the jugular vein produces tetanus and death in a few seconds: but even here dissection shows that the veratrine has acted on the intestinal canal, the mucous membrane of which is found injected. The lungs also exhibit signs of inflammation and conjestion.

From all which we infer that veratrine, introduced into the intestines, even in small quantity, produces none but local effects, or effects at least in the canal only, and that it must either be given in a large dose, or applied to parts where absorption is very active, such as the pleura, or the tunica vaginalis, in order to produce those general effects, which are so terrible.*

ACTION OF THE VERATRINE ON THE HUMAN SYSTEM, BOTH IN HEALTH AND IN DISEASE.

Although the action of this substance in large doses has not been observed on the human system, there can be no doubt that it would be the same as that just described.

Its taste is very acrid, without any perceptible bitterness; but, however small the quantity taken into the mouth, it excites profuse salivation. It is perfectly ino-

* See the paper of M. Andra, Jun. in the first number of Magendie's Journal of Physiology.

dorous, but must not be smelt too closely, for even the trifling quantity carried by the air into the nasal cavities, is often sufficient to produce violent and dangerous sneezing.

A quarter of a grain conveyed into the intestinal canal, readily produces very copious dejections; and by a trifling quantity beyond this, vomiting, more or less violent, is excited. M. Magendie, however, has lately given it to the amount of two grains in 24 hours, without excessive purging, in the case of an old man who had suffered an apoplectic attack; which furnishes another proof that the state of the nervous system materially influences the action of medicines.

In consequence of having tasted (although very cautiously) the mixture containing these two grains, our author was affected with an intolerable sense of acrimony in the mouth and pharynx for several hours afterward; indeed the impression had not entirely subsided the next day—although the patient was sensible of nothing of the kind.

CASES PROPER FOR THE EXHIBITION OF VERATRINE.

As this substance produces the peculiar effects of the plants which furnish it, it may be substituted for them with great advantage, as we know the quantity of the active principle which is employed. It is a particularly convenient remedy in cases requiring prompt action of the bowels; and given with this view, it has succeeded remarkably well with old men in whose large intestines there was an enormous accumulation of fæces. It ought to take the place of those Pharmaceutical preparations whose basis is either colchicum or hellebore; they would thereby be rendered more powerful therapeutic agents, and at once more convenient and certain. By this change the tincture of colchicum, the eau medicinale, and some others, would lose that uncertain character which gives just cause of dissatisfaction with them.

MEDICINAL EMPLOYMENT.

PILLS OF VERATRINE.

Take of Veratrine ..... ½ grain.

Gum arabic and syrup sufficient to make six pills. One of which is to be administered; and if no purging follows, three may be given in the course of the day.

TINCTURE OF VERATRINE.

Take of Veratrine..... 4 grains.*
Alcohol ..... 1 once.
Mix.

This tincture may be given in the quantity of from 10 to 25 drops in a cup of any drink. It may be administered internally instead of the tincture of colchicum in dropsies, leuco phlegmasia, and anasarca; and externally in frictions, in the same disorders, and also in gout.

SOLUTION OF VERATRINE.

Take of Sulphate of Veratrine..... 1 grain.
Distilled water ..... 2 onces.
Mix.

To be substituted for the eau medicinale of Husson.

OINTMENT OF VERATRINE.

Take of Veratrine ..... 4 grains.
Axuge..... 1 once.
Mix.

In external application in cases of chronic rheumatism, anarsarca, and gout.

PRUSSIC OR HYDROCYANIC ACID.

M. Magendie, in a memoir presented to the Academy of Sciences in November, 1817, reported the good effects that had attended the employment of prussic acid in pul-

* In the original, four *ounces* of Veratrine are directed to be used, which must be a mistake.

monary complaints. Since that time the medicine has been used by a great number of physicians, not only in Europe, but also in the United States. The success has been uniform; and this article, so redoubtable in itself, ought to be looked upon as one of the most interesting in the resources of the healing art.

Scheele was the discoverer of this acid, in 1780; although he could only obtain it mixed with a variable proportion of water. To M. Gay-Lussac we are indebted for its acquisition in a state of purity.*

PHYSICAL PROPERTIES.

Prussic acid, at the ordinary temperature, is liquid, transparent, and colourless; its taste, at first of an agreeable freshness, soon becomes acrid and irritating; it slightly reddens the tincture of turnsol. Its odour is powerful and noxious, being insupportable when not mixed with a large proportion of air; it then resembles the smell of bitter almonds.

CHEMICAL PROPERTIES.

Prussic acid is extremely volatile. In fact, it boils at 26° 5, under a pressure of 0? 76; and at 10° sustains a column of mercury of 0° 38. Its congelation, however, is easily effected, and takes place at 15° of cold; so that, when a few drops of this acid are poured upon paper, the portion which evaporates instantly produces a degree of cold sufficient to crystallize the other: it is the only liquid which possesses this property. It is but slightly soluble in water; on which account, when agitated with 10 or 12 times its bulk of this fluid, it collects on the surface in the manner of oil or ether. It is readily soluble in alcohol. Left to itself, in well-stopped vessels, it sometimes decomposes in less than an hour; and it can rarely be preserved longer than a fornight.†

* Annales de Chimie, tom. 67 and 95.

† The prussic acid prepared after the formula of Dr. Nimmo by Messrs. Waugh, 177 Regent-street, is warranted by these gentlemen to keep, without deterioration, for six months. Their known respectability entitles their assertion to the fullest credit.—Tr.

PREPARATION OF PRUSSIC ACID.

It is obtained by treating the deuto-cyanuret of mercury in crystals, but reduced to powder, with two-thirds of its weight of fuming hydrochloric acid.* The apparatus to be used for this purpose consists of a small tubulated retort, to which is adapted a tube of sufficient length, bent at a right angle, at one of its extremities, which is placed in a very narrow flask, or still better in an *eprouvette* surrounded with ice and salt. The horizontal portion of the tube, that which is adapted to the retort, should contain some pieces of carbonate of lime, followed by others of chloruret of calcium. The apparatus being thus prepared, and the retort placed upon a small furnace, the deuto-chloruret of mercury and hydro-chloric acid are to be introduced into it, through the tubula. Gentle heat being then applied, the decomposition of the deuto-cyanuret of mercury commences; the hydro-cyanic acid resulting from the action of the hydro-chloric acid upon the deuto-cyanuret of mercury, passes by the tube and is condensed in the *eprouvette*, surrounded by salt and ice, after being deprived, by its contact with the carbonate of lime and the chloruret of calcium, of all the water, and of all the hydro-chloric acid, which, by the effect of the heat, may have been volatilized with it.

M. Vauquelin has proposed to obtain the acid by decomposing the cyanuret of mercury by sulphuretted hydrogen. The apparatus to be employed is somewhat different. To the retort is adapted a globe, containing a mixture of sulphuret of iron and diluted sulphuric acid. The cyanuret of mercury is placed in the horizontal tube already described, and near the extremity attached to the globe. Beyond the deuto-cyanuret, fragments of carbonate of lead and of chloruret of calcium are placed; the former to absorb the small quantity of sulphuretted hydrogen which might remain undecomposed by the cyanuret of mercury, the latter to take up the water which the hydro-cyanic acid might otherwise carry along with it.

* Acidum muriaticum, P. L.

ACTION ON ANIMALS.

One drop of pure prussic acid introduced into the fauces of a remarkably strong dog killed him instantly, after two or three deep and hurried inspirations: a few particles applied to the eye will produce effects almost equally sudden, and in other respects similar. One drop diluted with several drops of alcohol, injected into the jugular vein, will kill the animal as suddenly as if it were struck with lightning; and in animals poisoned in this manner, scarcely any traces of muscular irritability can be detected a few moments after death. In the Transactions of the Medical Society of Copenhagen,* there is an article by Dr. Viborg, in which that learned gentleman reports having administered prussic acid in very large doses to animals, without depriving them of life. The acid employed by him had evidently been prepared according to Scheele's method, or some other which furnishes an impure product. In order, therefore, to ensure constant and comparable results, it is requisite to adhere to one process. We recommend the uniform employment either of that of Gay-Lussac or of Vauquelin.

ACTION ON THE HUMAN SYSTEM.

Prussic acid produces the same effects on man as upon animals. Even its vapour should be carefully avoided; for if respired, it causes considerable pain in the chest, and a feeling of oppression, which does not go off for several hours. Properly diluted, its effect in sickness is to calm an undue degree of irritability, which occurs in certain organs.

Even in proper doses, when given too frequently, we have seen it produce headache, and a sort of vertigo, which go off in the course of a few minutes.

CASES IN WHICH PRUSSIC ACID MAY BE EMPLOYED.

Diluted in the way we are about to describe, the prussic

* Acta nova regiæ Societatis Mediæ Harniensis, vol. II, Haf. 1821.

acid is employed successfully in all cases of morbid irritability of the pulmonary organs; it is also advantageously employed in the treatment of nervous and chronic coughs, asthma, and hooping-cough; as well as in the palliative treatment of phthisis: in fact, there is good reason to believe that a cure may be effected by it when the disorder is in its first stage. It has likewise been employed in England, with success, in hectic cough, and where this symptom is sympathetic with an affection of some other organ, as also in dyspepsia.

Dr. Elliotson, both in hospital and private practice, has employed it extensively, prepared after the process of Vauquelin, which it is perhaps necessary to mention, as in England the acid is almost exclusively obtained by Scheele's method. This physician has recorded more than 40 cases of dyspepsia, with or without vomiting, accompanied with considerable pain in the epigastric region, and with pyrosis, which were cured by the medicinal prussic acid. He likewise quotes a case of colica pictonum* in which Dr. Prout gave the acid and procured instantaneous relief. Dr. Elliotson has also given this remedy in a great number of pectoral affections; and has almost always succeeded in allaying the harassing cough. Used externally, in the form of lotion, to affections of the skin, it has not in this gentleman's experience produced any very marked effects; but Dr. Thomson† declares, that it has always answered the purpose of diminishing the itching and heat so troublesome in cutaneous disorders, and has cured several species of herpes, particularly the Acné rosacea.

M. J. Bouchenel has also published an interesting memoir‡ on the employment of prussic acid in chronic pulmonary catarrh; in which four successful cases are recorded. This writer concludes by saying, that when employed in small doses, the medicine produces no greater inconvenience than an ordinary linctus; that it is not proper in the acute stage of the disorder, and that its success will be

* Misquotation, it was not a case of colica pictonum, but of gastrodynia after that disease, vide Elliotson on Hydrocyanic acid.—Tr.

† Med. and Physical Journal, Feb. 1822.

‡ Bulletin de l'Athenee de Medicine Nouv. Bibl. Med. Aout. 1824.

ensured if antiphlogistic means are adopted previous to its exhibition. He has likewise employed it in a case of phthisis, but succeeded merely in allaying the cough for a time, from which he doubts the fact of this disease having been cured by hydrocyanic acid. M. Magendie, however, repeats, that he has seen persons cured who have had all the symptoms of phthisis, not only in the first, but in a more advanced stage.

This remedy has been used in Italy to allay excessive irritability of the uterus, even in cases of cancer, and to moderate the action of the heart in almost all sthenic disorders.

Professor Brera speaks of its happy effects in pneumonia,* and recommends it both in rheumatic cases, and as a vermifuge: and since this gentleman has employed it in diseases of the heart, Dr. Macleod† has exhibited it in similar cases; he says he has allayed nervous palpitations by means of it, particularly those which appeared to depend on derangement of the digestive organs; he has also employed it as a palliative in some cases of aneurism of the heart. He never pushed the quantity farther than 28 drops in the 24 hours, and has never seen any unpleasant consequences.

Dr. Frisch of Nyborg, in Denmark, has allayed the intolerable pain caused by cancer of the breast, which had resisted all the antispasmodics, by washing the cancerous surface with diluted prussic acid. He has likewise employed it advantageously in several cases of phthisis. He quotes an instance of cure.‡ Dr. Guerin of Mamers, has used it successfully in a case of brain fever.

MEDICINAL EMPLOYMENT.

The medicinal properties of prussic acid prepared according to Scheele's process are not of sufficient uniformity —in consequence of the arbitrary discretion which the process allows the operator. The acid, therefore, pre

* Prospetti de' resultamenti ottenuti nella clinica medica. Padova, 1816.
† Bulletin des Sciences Med. Feb. 1824.
‡ Bibliotek for læger, &c.

pared by M. Gay-Lussac is much better fitted for use, provided it be properly diluted. It is to be mixed with six times its volume, or 8,5 times its weight of distilled water. This is the preparation to which M. Magendie has given the name of medicinal prussic acid.

This preparation may also be made, by adding to hydrocyanic acid six times its bulk of alcohol; it then preserves its properties better, and evaporates much less quickly than when mixed with water. Of late it has been proposed to employ an acid more concentrated: as, for example, three-fourths of water with one-fourth of acid; but this plan does not appear to possess any advantages over the other and more usual one. The following are the formulæ most generally employed by M. Magendie:

PECTORAL MIXTURE.

Take of Medicinal prussic acid ..... 1 gros.
Distilled water ..... 1 livre.
Purified sugar ..... 1½ once.
Mix.

Of this let five *gros* be taken night and morning. The dose may be increased to six or even eight times this quantity in the twenty-four hours.

It is very important that the mixture be well shaken immediately before using it, to avoid serious consequences, as the acid floats on the surface of the water.

PECTORAL POTION.

Take of Infusion of ground ivy..... 2 onces.
Prussic acid ..... 15 drops.
Syrup of marsh mallows..... 1 once.
Mix.

Five *gros* to be given every three hours, shaking the phial.

CYANIC SYRUP.

Take of Simple syrup ..... 1 livre
Med. prussic acid ..... 1 gros.
Make a syrup.

This preparation is used in common pectoral drinks, and as a substitute for other syrups.

MIXTURE FOR LOTIONS.

Take of	Med. hydrocyanic acid.....	1 to 2 gros.
	Lettuce water.....	1 pinte.

Mix.

The quantity of the acid may be augmented to four *gros*.

This mixture is used for lotions in cases of herpes, cancerous ulcerations, and injections in cases of cancer uteri.

REMARKS ON PRUSSIC ACID.

Reasons have been already adduced for discountenancing the employment of the acid of Scheele. It never bears a decided proportion of real acid to the water which it contains. This arises from the difficulty of uniting the same circumstances in every operation. If, in order to avoid this inconvenience, we propose to prepare the acid called Scheele's with the pure acid of Gay-Lussac, by diluting this latter with water, what quantity should be employed? According to M. Robiquet,* two parts of water should be united with one of the pure acid. The acid of Scheele prepared in this manner is twice the strength of that we have mentioned, and therefore, presents greater inconveniences in its employment; and these are still further augmented by the inexact manner in which M. Robiquet's method is described in the Parisian codex. The formula there given, (from the memoir of Robiquet,) directs the acid to be diluted with equal parts of water:- and afterward, a receipt is given for the preparation of a syrup, in which the prussic acid, mixed in this, form some ninth part of the whole. This syrup, however, cannot be given in larger doses than drops;† for were an ounce of it unfortunately to enter into a mixture, the consequences would be fatal.

But notwithstanding all that we have said concerning the strength of the prussic acid of Scheele prepared according to the codex, and the method of M. Robiquet, the majority of physicians consider it much weaker than our

* Journal de Pharmacie, 1818.

† Many serious consequences have occurred from the use of the syrup of the new codex.

medicinal prussic acid, and sometimes order it to the amount of more than 1 *gros* in a mixture of 4 *onces*, to be taken by spoonsful. The Paris Apothecaries thus, for the most part, are so accustomed to see the prussic acid of Scheele, entering in large quantity into the composition of medical prescriptions, that, in order to prevent accidents, they prepare their acid by mixing that of Gay-Lussac with forty parts of water. This quantity of water (entirely arbitrary) admits at least of their making up prescriptions without danger, when they perceive, by the extent of the dose of the acid, that it is not Magendie's medicated acid, which the Physician has had in view, when writing the prescription.

SOLUTION OF CYANURET OF PURE POTASSIUM, AS A SUBSTITUTE FOR PRUSSIC ACID.

The difference of results obtained by Physicians in the employment of prussic acid may be accounted for on the supposition that the medicine is not always identical, on account of its great volatility, and the readiness with which its elements disunite. We have also pointed out a slight modification in the preparation of medicinal hydrocyanic acid, which in great measure obviates this inconvenience. MM. Robiquet and Villermé, however, have thought that the cyanuret of potassium might be substituted with advantage—the action on the animal system being the same.

MODE OF PREPARATION.

The process given by M. Robiquet consists in exposing the ferruginous prussiate of potass for a considerable time to heat; whereby the cyanuret of iron is completely decomposed, while that of the potassium remains unaltered. The residue of this intense calcination consists of a blackish lamellated mass, which is merely the cyanuret of potassium soiled by the iron and charcoal, which belonged to the cyanuret of iron. This mass is to be washed in water;

it is allowed to deposite the charcoal and iron, while the cyanuret of potassium is dissolved and transformed into a hydro-cyanuret of potass.

When the operation has been well conducted, the solution is perfectly colourless, and retains no iron whatever. The cyanuret well prepared and pure, is white and transparent; it may be fused by heat without undergoing any change; and may be preserved for an indefinite length of time, provided it be kept defended from humidity.

ACTION OF CYANURET OF POTASSIUM AND OF HYDRO-CYANATE OF POTASS ON ANIMALS.

Experiments on this subject were made by MM. Robiquet and Villermé in Magendie's presence. The tenth part of a grain of cyanuret of potassium destroyed a linnet in the space of one minute; and rather less than a grain killed a guinea-pig in two or three minutes.

A small drop of the hydrocyanate of potass, not containing more than one hundredth part of a grain of the cyanuret in solution, killed a linnet in half a minute. Half a *gros*, containing five grains of the cyanuret, killed a dog of considerable size in a quarter of an hour. The symptoms were similar to those produced by prussic acid. We have not had yet an opportunity of studying its effect on the human system.

MEDICINAL EMPLOYMENT.

Cyanuret of potassium being dissolved in eight times its weight of distilled water, is transformed into the hydrocyanate of potass. Cyanuret, mixed with water in this proportion, may be designated, the medicinal hydro-cyanate of potass, and it may be given without danger in the same doses as in the medicinal prussic acid, and may form an ingredient in the same preparations that contain the acid. It is practicable to render it perfectly independent of the action of the small portion of alkali contained in the cyanuret, by adding a few drops of any vegetable acid, or by prescribing it in combination with some acidulous syrup;

besides which the remarkable advantage would be gained of setting the prussic more at liberty.

If the cyanuret of potassium instead of the hydrocyanate of potass be introduced into a draught, we must commence with a quarter of a grain, and gradually augment the dose to a grain, a quantity which has already been exceeded by some practitioners.

FORMULÆ.

PECTORAL MIXTURE.

Take of	Med. Hydrocyanate of Potass....	1 gros.
	Distilled water.....	1 livre.
	Purified sugar.....	1½ once.

Mix.

Five *gros* to be given night and morning; which may be gradually increased to six or eight such doses in 24 hours.

PECTORAL DRINK.

Take of	Infusion of ground Ivy..	2 onces.
	Med. Hydrocy. of Potass	15 drops.
	Syrup of marsh mallows	1 once.

Mix.

Five *grammes* every three hours.

POTION WITH CYANURET OF POTASSIUM.

Take of	Lettuce water.....	2 onces.
	Cyan. of potassium.....	½ grain.
	Syrup of marsh mallows..	1 once.

Mix.

Five *gros* every two hours.

SYRUP OF HYDROCYANATE OF POTASS.

Take of	Simple Syrup.....	1 livre.
	Med. Hydrocy. of Potass	1 gros.

Make a syrup.

This syrup may be added to ordinary pectoral draughts, and may be substituted for the other syrups.

CYANURET OF ZINC.

This preparation has been of late employed in Germany instead of the hydrocyanic acid; and it has obtained the reputation of possessing decided vermifuge powers. We shall point out the mode of preparing a composition which is apparently the one in vogue in Germany.

MODE OF PREPARATION.

M. Pelletier has made some investigations with the view of obtaining this combination, and has succeeded in the following manner. He precipitates sulphate of zinc by hydrocyanate of potass; forming a triple hydrocyanate of zinc, which being well dried, and calcined at a dull red heat, is converted into cyanuret of zinc. It always contains, however, cyanuret of potassium. It is probable that this is the German preparation; but it is not directly demonstrated that it is so.

MEDICINAL EMPLOYMENT.

This preparation may be given in the same doses as cyanuret of potassium, beginning with one-fourth of a grain, and advancing gradually to a grain and a half, in a mixture to be taken by spoonsful.* But great caution must be observed in this administration.

Dr. Henning reports (in Hufleand's Journal for 1823,) that this preparation has been given advantageously in cases for which hydrocyanic acid is ordinarily employed, more especially among children, in cases of worms. He there gave one grain with powder of Jalap. He has likewise employed it in disorders consequent to dentition—has found it very useful in nervous affections of the stomach, particularly in cases of cramp; in these disorders he used the following preparation.

Take of	Cyanuret of Zinc.....	6 grains.
	Calcined Magnesia.....	4 grains.
	Cinnamon powder.....	3 grains.
Mix.		

* A very vague statement, and by which it is almost impossible to determine the dose.—Tr.

This dose to be repeated every four hours. Sometimes the cyanuret is mixed with sugar, and its action is promoted by giving at the same time a warm infusion of aromatic plants. The same remedies were employed in dyspepsia, and in painful menstruations. Dr. Henning records 12 cases; and, according to him, the preparation under notice is preferable to the hydrocyanic acid.

CYANURET OF IODINE.

This new compound of iodine, azote, and carbon, was discovered by M. Serullas* while repeating some of the beautiful experiments of Sir H. Davy and Mr. Faraday upon the liquefaction of the gases; but he soon ascertained that the combination of iodine and cyanogen might be effected without the aid of compression.

PHYSICAL AND CHEMICAL PROPERTIES.

Cyanuret of iodine, when purified by gentle sublimation (as we shall explain hereafter when speaking of the mode of preparation) is very white; and presents itself in the form of very long needles, exceedingly thin: its odour is highly pungent; it irritates the eyes greatly and excites tears: and its taste is very caustic. The specific gravity of this substance is greater than that of sulphuric acid, through which it readily precipitates. It volatilizes without being decomposed, at a temperature considerably above that of boiling water. Thrown upon burning charcoal, it gives off abundantly violet-coloured vapours, and is more soluble in alcohol than in water. These colourless solutions have the taste and odour of the substance itself; they redden neither the tincture of turnsol nor that of turmeric; and by itself it does not decompose the water. With nitrate of silver no precipitate is produced.

A concentrated solution of potass decomposes the cyanuret of iodine, forming the hydriodate and hydrocyanate

* Annales de Chimie et de Physique. Oct. 1824.

of potass: nitric acid appears to have no action upon it; and sulphuric acid does not attack it till after a certain time. Hydrochloric acid decomposes it; but the most remarkable action is excited by liquid sulphurous acid; which decomposes it quickly, while the acid is disengaged. Neither sulphurous acid gas, when very dry, nor chlorine, exerts any action upon this compound.

PROCESS FOR OBTAINING THE CYANURET OF IODINE.

In order to effect the combination of the acid with the cyanogen, M. Serullas triturates carefully and promptly, in a glass mortar, two parts of cyanuret of mercury well dried, with one part of iodine in the same state. This mixture is to be introduced into a phial with rather a wide neck; and heat gradually applied, until the cyanuret of mercury begins to be decomposed—of which the crepitation, the disappearance of violet-coloured vapours, and the commencing condensation of a white substance at the mouth of the phial, are the indications. It is then to be carried by means of a pair of bent tongs, near to a large glass bell, placed on a sheet of paper, or still better on a large square of glass. One side of the bell is to be raised in order to admit the neck of the phial under it, so that it may be placed in a manner convenient for emptying it of its contents. At this moment white vapours rapidly leave the phial, and condense on the surface of the glass, in the form of cotton-like flakes. When these cease to come off, heat is again to be applied for the purpose of receiving them under the bell.* This operation may be very well performed by heating the mixture in a little glass retort, which is attached to a small receiver. But there is some difficulty in obtaining the product, and we are longer exposed to the emanations, which may prove injurious.

When, for the preparation of cyanuret of iodine, we employ the iodine and cyanuret of mercury in the proportions described, the inconvenience of a superabundance of iodine is avoided; but it is not the less necessary to effect

* Literal.—Tr.

a sublimation, in order to separate a portion of ioduret of mercury which is mixed with it. This sublimation must be made by a uniform temperature. M. Serullas, for the greater certainty of this effect, prefers the heat of a water bath, notwithstanding the tediousness of the process.

With this view, impure cyanuret of iodine is introduced into the bottom of a glass tube, rather wide, in such a manner that none of it adheres to the sides. It is to be placed in the bath, the ebullition of which is to be kept up until nothing remains in the inferior portion of the tube but the red ioduret of mercury, which, at this temperature, is not volatile. The tube should be inclined a little out of the bath, so that the volatilized cyanuret of iodine may fix upon that part, which from its position is the coolest.

COMPOSITION OF CYANURET OF IODINE.

To determine the proportion of the principles which constitute this substance, various quantities have been decomposed by means of red-hot iron. The ioduret of iron, which results, treated by pure potass, produces ioduret of potassium, which, according to its known composition, (taking the mean of five experiments), presents in each *gramme* of the cyanuret 0.8066 of iodine—whence it may be calculated that a *gramme* of cyanuret of iodine contains

Iodine	0.828	1 atom.
Cyanogen	0.172	1 atom.

It is to be remarked, however, says M. Serullas, that in each of these experiments the quantity of iodine was rather less than what it should have been, upon the supposition that there was an atom of each of the two bodies. At all events, the difference is not great enough to warrant the conclusion that this compound consists of one atom of iodine and two of cyanogen.

ACTION OF CYANURET OF IODINE ON THE HUMAN SYSTEM.

According to its composition, in the opinion of M. Serullas, this substance ought to exert very energetic powers on the animal economy, and probably medicine may find a fit

occasion for its employment. It does not appear, however, to be so deleterious as the nature of its elements might lead us to suppose. This distinguished chemist (to whom we are indebted for his excellent inquiries concerning the cyanuret), tasted it; and several persons in his laboratory, who, as well as himself, had been exposed to it, when preparing and securing it, respired it in considerable quantity: the only consequences were, a general weakness, and violent irritation of the eyes, which shortly, however, went off.

M. Thenard had furnished M. Magendie with a sufficient quantity of this substance; but our author was not able to report upon its mode of action.

SOLANINE.

This alkali was discovered by M. Desfosses, apothecary at Besançon, in two plants of the family of the solaneæ, the solanum nigrum, and the solanum dulcamara. It exists in both these plants, in the leaves of the solanum dulcamara it is readily detected, while none has been found in the leaves of the solanum nigrum.

Several able chemists have subjected these plants to the processes pointed out by M. Desfosses, and have obtained nothing but a little phosphate of lime and vegetable matter, without the slightest trace of the alkali. It would therefore be of some importance if M. Desfosses were to repeat his experiments, so as to be able to confirm the fact he has advanced, or to point out how it has happened that solanine could not be obtained at Paris.

MODE OF PREPARATION.

Solanine is found in greatest abundance in the berries of the solanum nigrum, where it exists in the state of malate. In order to obtain it, the juice of these berries, when filtered, is to be treated with ammonia, whereby a gray-coloured precipitate is obtained. This deposite, collected on a filter, washed and treated with boiling alcohol, yields by evaporation a salifiable base; which is in effect sufficiently pure, provided that the berries have been perfectly

ripe. But while these are still green, the solanine remains in combination with a certain quantity of the green colouring matter of the plant, which is with difficulty separated.

PROPERTIES OF SOLANINE.

When perfectly pure, it presents itself in the form of a white opaque, and sometimes pearly powder: it has no smell, is of a slightly bitter and nauseous taste; and its bitterness is developed by solution in acids—particularly the acetic. Its salts, formed with these bodies, are uncrystallizable; and the solution, by means of evaporation, is transformed into a gummy, transparent, and easily pulverizable mass.

Solanine is insoluble in cold water, and even hot water takes up only one eight-thousandth part. It is slightly soluble in alcohol.

Its alkaline properties are faintly exerted on turmeric; it restores, however, the blue colour to turnsol paper reddened by acids: with these it unites, even when cold, and when proper attention is paid, will form solutions perfectly neutral. Like all vegetable alkalies it requires but a small portion of acid for the purpose of saturation.

ACTION OF SOLANINE UPON ANIMALS.

Introduced into the stomach of a dog or a cat, to the amount of 2 to 4 grains, it produces violent vomiting, followed quickly by a state of drowsiness, which lasted several hours.

A young cat supported 8 grains without fatal consequences; but after violent vomiting, it fell into a profound sleep, which lasted nearly thirty-six hours.

Some of the solanine extracted from the solanum ferox,* that the author received from M. Pelletier, was tried upon two dogs, in which it produced abundant salivation, but no drowsiness.

ACTION OF SOLANINE ON THE HUMAN SYSTEM.

If a very small quantity be swallowed, a strong feeling

* Atropa Belladonna of Linnæus

of irritation is perceived in the throat. Introduced into the mouth the solanine imparts a nauseous slightly bitter taste, which becomes very intense if the substance be dissolved in a small quantity of acetic acid. The acetate is the only salt of solanine which has been tried upon the human species. In the dose of a quarter of a grain it produces nausea, but the tendency to sleep has not been remarked.

From what has been said it appears that solanine, like opium, may produce vomiting and sleep; but its emetic powers seem to be more decided than those of opium; while its narcotic properties are evidently much less so.

CASES FOR ITS ADMINISTRATION.

It has not yet been given in cases of disease; but it may be employed wherever the extract of solanum nigrum or that of the dulcamara may be indicated.

DELPHINE.

This alkali was detected in 1819, in the seeds of the delphinum staphisagria, by MM. Feneulle and Lassaigne, who thus named it from a belief that the acrid properties of the whole family depended upon this principle—an opinion, however, which has not been confirmed by the analysis of other plants belonging to it.

MODE OF PREPARATION.

A quantity of the seeds, cleared of their covering, and reduced to a fine paste, is to be boiled in a little distilled water. The decoction is first to be passed through linen, and then filtered. Very pure magnesia is to be added, and the ebullition to be continued for several minutes. At the end of this time it is again to be filtered; and the residue, well-washed, submitted to the action of highly rectified alcohol. This tincture being evaporated, the delphine is obtained in the form of a white powder presenting points of crystallization. To procure, however, a large quantity

without the tedious operation of cleaning the seeds, the following method may be employed. These, not cleared of the husk, are to be well bruised and submitted to the action of weak sulphuric acid. The liquor is to be precipitated by means of ammonia, and the delphine afterward taken up by alcohol, which receives also a small quantity of colouring matter. In order to purify it, the alcohol is to be drawn off by distillation; the residue is to be dissolved in hydrochloric acid,* and boiled with magnesia. The deposite is again to be taken up by alcohol, which furnishes the delphine perfectly pure.

PROPERTIES OF DELPHINE.

When pure it presents itself in the form of a white powder, crystalline when humid, but becoming opaque by exposure to dry air. It has no smell, but a taste at first very bitter, and afterward becoming acrid. Water dissolves but a very small quantity, which is not perceptible, except from the slight bitterness which it imparts. Alcohol and ether dissolve it readily: the alcoholic tincture gives a strong green colour to the syrup of violets, and restores the blue to paper reddened by acids. With the sulphuric, nitric, muriatic, oxalic, acetic, and other acids, delphine forms very soluble neutral salts, whose taste is extremely bitter and acrid. It is precipitated by alkalies in the form of a white jelly.

It has not yet been tried as a medicine; but if staves-acre possesses any medicinal power, it is to be presumed that it resides in this alkali. It may, therefore, be employed where this plant is considered proper; and the salts, of which it forms the base, will then be preferable, on account of their solubility.

GENTIANINE.

A very singular circumstance is connected with the discovery of this principle. M. Henry and M. Caventou

* Acidum Muriaticum, P. L.

were both employed at the same time, and without any knowledge of each other's proceedings, upon the analysis of gentian; and arrived at results so perfectly identical, that upon comparing notes, they found the appearance of co-operation so striking that they resolved to promulgate their labours together.*

PREPARATION OF GENTIANINE.

The powder of gentian is to be exposed to cold ether, which, at the end of forty-eight hours, furnishes a greenish tincture; this being filtered, poured into an open vessel, and exposed to heat, if the liquor be sufficiently concentrated, upon cooling, settles into a yellow crystalline mass, possessing a decided smell and taste of gentian. This mass is then to be treated with alcohol until it ceases to yield a citron colour. The washings are to be mixed, and exposed to a strong heat, and the yellow crystalline substance begins to reappear, assuming at the close of the evaporating process a solid mass, extremely bitter. Taken up again by weak alcohol, it is partially dissolved, a certain portion of oily matter remaining separate. This last spirituous solution, besides the bitter principle of the gentian, contains an acid substance, and the odorous principle also.

Upon evaporating this liquid to dryness, washing the residue in water, adding a little calcined and well-washed magnesia, boiling and evaporating in a water-bath, the greater part of the odorous matter of the gentian is driven off, the acidity is removed by the magnesia, and the bitter principle remains, partly free, and partly in a state of combination with magnesia, to which it imparts a beautiful

* A remarkable fact, on two accounts—first, as proving the degree of perfection to which the modes of vegetable analysis have of late years reached; and secondly, as illustrating the change that the progress of science has wrought upon its votaries. Had such a contingency happened 100 years back, the consequence would have been an obstinate dispute between the parties. In the present day it has been the cause of pleasure to them, each finding the importance of his discovery confirmed by that of the other.

M. Caventou has recently extracted from the root of the cassia fistula, a bitter principle, which may be found very useful in the treatment of intermittent fevers; it has the singular property of forming with nitric, muriatic and sulphuric acids, combinations not very soluble in water; on the contrary it is very soluble when combined with potass, soda, ammonia, and even magnesia, lime, barytes, &c.

yellow colour. Then, upon boiling this magnesia with ether, the greater part of the bitter principle is obtained pure, and is insulated by evaporation. If it be wished to separate the greater part of the bitter principle which remains in the magnesia in a fixed state, and which could not be taken up by the ether, we may treat it with oxalic acid, in a quantity sufficient to produce slight acidity. This acid unites with the magnesia, and sets the bitter principle at liberty, which may be obtained in the manner already pointed out.

PROPERTIES OF GENTIANINE.

This substance is yellow, inodorus, possessing very strongly the aromatic bitter taste of the gentian, which is much increased by solution in an acid. It is highly soluble in ether and in alcohol, and separates by spontaneous evaporation in the form of very small yellow crystalline needles. It is much less soluble in cold water, which nevertheless it renders exceedingly bitter; in boiling water it is more readily dissolved. Diluted alkalies deepen its colour very much, and dissolve rather more of it than water will alone.

Acids diminish its yellow colour in a very remarkable manner. With sulphuric and phosphoric acids the solution is almost colourless; but yellowish with the weaker acids, such as the acetic. Concentrated sulphuric acid carbonizes it and destroys its bitterness.

Exposed in a glass tube to the heat of boiling mercury, gentianine sublimes in the form of small yellow crystalline needles, and is partially decomposed. It has no sensible effect on turnsol, either when blue, or reddened by acids—being apparently neutral.

ACTION OF GENTIANINE ON THE ANIMAL AND HUMAN SYSTEM.

M. Magendie has ascertained by experiment that this substance is not possessed of any poisonous qualities; several grains injected into the veins produced no effect. He himself swallowed two grains dissolved in alcohol and was

merely sensible of the extreme bitter taste, and a slight sensation of heat in the stomach.

MEDICINAL EMPLOYMENT.

The tincture seems to be the preferable form for administration; and it may be made in the following manner:

Take of Alcohol at 24° ... ...1 once.
Gentianine.....5 grains.
Mix.

This may be substituted for the tincture of gentian, and employed in the same circumstances.

SYRUP OF GENTIANINE.

Take of Simple syrup.....1 livre
Gentianine.....16 grains.
Make a syrup.

This is one of the best bitters that can be employed in scrofulous affections.

IODINE.

This simple substance was discovered in 1813, by M. Courtois, in the mother-waters of the soda of sea-weed: but we are indebted to M. Gay-Lussac for the greater part of our acquaintance with its properties. It may be obtained from most of the fuci which grow on the sea-coast—and according to Fyfe, from sponge.* In the mother-waters above mentioned, M. Gaultier de Claubzy has ascertained that it exists in the form of hydriodate of potass.† Several mineral waters, likewise, appear to be indebted to it for their properties. M. Laur Angelini, apothecary at Voghera, has, by means of starch, detected its presence in the saline waters of that place; but he has not given the details of his process. The same chemist has found Iodine in the waters of Salles, in the Voraguais

*Annales de Chimie, &c. Tom XII. page 405.
† Ibid. Tom XCIII. page 75.

which have some reputation in cases of goitre and obstructions of the lymphatics. Dr. Cantu, professor of chemistry at Twine, astonished at the effects of the sulphureous water of Castel Nuovo d'Asti in these diseases, had sought in vain, in the first instance, for iodine in it; but encouraged by the success of M. Angelini, he at length detected its presence.* M. Cantu is even inclined to think that iodine exists in all sulphureous waters which contain chlorurets. Several mineral waters, not of a sulphureous nature, particularly that of Echaillon, in Savoy, which yields one-twelfth of its weight of sea-salt, and which is considered highly efficacious in goitre, have not furnished the slightest trace of iodine.

M. Balard,† of Montpellier, in modifying the employment of starch as a reagent of iodine, has proved the existence of this body in various marine mollusca, both naked and testaceous; such as the doris, the venus, oysters, &c.; several of the polypi and marine vegetables, such as the gorgonia, the zostera marina, and most remarkably in the mother-water of the salts afforded by the Mediterranean; on account of its very small quantity he has not been able to verify the state in which iodine exists in sea-water, but supposes it to be that of a hydriodate.

Vauquelin has found iodine in combination with silver, in a specimen of that metal obtained from a mine near Mexico, whose site is not accurately known.

PHYSICAL AND CHEMICAL PROPERTIES OF IODINE.

The name has been derived from the Greek word ἰωδὴς, violet-coloured, on account of the colour possessed by it in the gaseous state. At the ordinary temperature it is solid, in the form of minute gray layers, very brittle, and

* Memoire della reale Acad, &c. di Torrino, tom. xxix. page 221.

† Annales de Physique et de Chimie. February, 1825.

The following is a short account of M. Balard's process. Having mixed the liquor containing the iodine with starch and sulphuric acid, a small quantity of the aqueous solution of chlorine is poured gently upon it, which, on account of its less specific gravity, does not mix with the other; but at the point of contact there appears a blue zone, which, however slight, cannot possibly be mistaken. If the vessel be slightly agitated, so as to mix a portion of the inferior liquid with the supernatural chlorine, the blue colour is developed where this fluid comes in contact; but if the agitation be carried so far as to mix the two liquids completely, the blue colour instantly disappears, if there be an excess of chlorine.

bearing some resemblance to plumbago. It fuses at a temperature of 170°* (cent); volatilizes at 175°; giving off very beautiful violet-coloured vapours, which being collected, condense again into new flat crystals.

Iodine is soluble in ether and in alcohol, the latter taking up a larger or smaller quantity, according to its degree of rectification. Water does not dissolve more than $\frac{1}{700}$ of its weight.

With hydrogen it forms one kind of acid, and with oxygen a different. We cannot combine iodine with oxygen in the gaseous state; but being united with it in the nascent gaseous form, the product is iodic acid. Its affinity for hydrogen is very strong, for it abstracts it from a great number of bodies; and when the temperature is elevated, absorbs it in the gaseous state. With this gas it forms the hydriodic acid, composed merely of iodine and hydrogen. This acid presents itself under the form of a colourless gas, with an intense taste and smell, reddening strongly the tincture of turnsol, and extinguishing bodies in a state of combustion. It is rapidly absorbed by water, which dissolves a great quantity of it, and gives off white vapours in the air, which unite with the moisture of the atmosphere.

Hydriodic acid may be obtained by pouring water on an ioduret of phosphorus, made with eight parts of iodine and one of phosphorus, and then distilling the liquor. The portion which first comes over is merely water; but the last, if separately collected, is highly concentrated, and fills the atmosphere with thick fumes. This is the acid in question; the phosphoric acid, formed at the same time, remains at the bottom of the retort.

Hydriodic acid will unite with a great number of bases, forming with some of them neutral salts, of which the most frequently employed in medicine hitherto is the hydriodate of potass. Hydriodate of soda has been also sometimes used and apparently with equal success.

MODE OF PREPARATION.

It is extracted, as has been said, from the mother-waters

* Centigrade, see Tables after Translator's Preface.

of soda prepared from sea-weed, where it exists in the state of hydriodate of potass. These waters are obtained by burning the fuci that are found on the coast of Normandy, draining water through the ashes, and concentrating the liquor.

To obtain the iodine, an excess of concentrated sulphuric acid is added to these waters, and the liquor is gradually brought to ebullition in a glass retort, furnished with a receiver. The acid seizes on the basis of the hydriodate and on the hydrogen of the hydriodic acid, so that the result is sulphate of potass, water, sulphurous acid, and *iodine*, which rises in violet-coloured vapours, passes into the receiver with a small quantity of acid, and in that state is condensed. In order to purify it, it must be washed, mixed with water containing a little potass, and again distilled.

PREPARATION OF THE HYDRIODATES OF POTASS AND SODA, BOTH SIMPLE AND IODURETTED.

If a solution of soda or potass be poured upon iodine in the metallic state, we produce an iodate and an hydriodate which may be separated from each other by means of alcohol, as it possesses the power of dissolving the latter of these salts only, and the hydriodate is obtained pure, by evaporation.

The hydriodates of soda and potass may also be obtained in the same manner as the other neutral hydriodates —that is to say, by combining the acid directly with the oxide. They are deliquescent salts, and consequently very soluble in water. Their solution is capable of dissolving more iodine, and thus forming an iodurettted hydriodate.

M. Baup of Nevay,* and Caloud of Annecy,† have found (each of himself) the same process for obtaining hydriodate of potass by means of hydriodate of iron, in the following manner. One part of iodine, and from three to four of water, are introduced into a phial or matrass ; to

* Naturivis Anzeigr. 1821. † Journ. de Pharmacie, Oct. 1822.

these are added gradually, and at intervals, an excess of filings of pure iron, half a part for example. A combination immediately takes place, much heat is disengaged, the iodine disappears, and the liquid assumes a deep red colour. During this marked reaction, an iodurctted hydriodate is formed; by heating gently, and agitating for an instant, while yet warm, it is converted into a simple hydriodate of iron. The cessation of the action is indicated by the almost entire colourless state of the liquid; but still more certainly when it will no longer impart a red tinge to white paper. The liquor is filtered, diluted with several parts of water, and placed upon a sand-bath, in a capsule or matrass, till ebullition nearly takes place; after which, the iron is precipitated by means of the carbonate or subcarbonate of pure potass. This part of the process demands some attention, in order to avoid adding an excess of potass; which might indeed be again separated by repeated crystallization, or saturated by hydriodic acid. After filtration, in order to separate the ferruginous deposite, and washing well, we proceed to evaporate the filtered liquid, commencing by the waters used in the washing. The salt may be crystallized by cooling, or by evaporation; in the latter case, a concentrated solution of the hydriodate of potass is to be placed, not upon a stove, because the salt would rise upon the sides of the vessel, and finish by carrying off all the liquid, but upon a very moderate fire, where the edges of the vessel, not being so hot as the bottom, may in some measure condense the vapour which rises, and thereby prevent the ascent of the salt. By degrees, crystals are deposited; and when they fill nearly all the space occupied by the liquid, it is allowed to cool, and the mother-waters are to be carefully drawn off, which should then be evaporated in order to obtain more salt; finally, the crystals are to be perfectly dried on a stove, or over a fire, where they undergo a slight decrepitation.

In order to obtain this salt perfectly pure, it must be again crystallized, especially if the potass has been added in excess. If the iron employed has been somewhat coppered, a few bubbles of sulphurated hydrogen should be

passed through the mother-waters, and filtering should be employed before proceeding to these new crystallizations.

The hydriodate of potass (ioduret of potassium) crystallizes ordinarily in cubes; but by careful evaporation it may be obtained in pyramids. They are almost always opaque or milky white. By slowly cooling a solution not very concentrated, M. Baup has obtained it crystallized in long quadrangular prisms, and also in short prisms, terminated by a four-sided pyramid.

The solubility of the ioduret of potassium, at a temperature of 18° centigrade has been ascertained by M. Gay-Lussac: 100 parts of water will take up 143 of this ioduret. M. Baup has found that the same quantity of water, at a temperature of 12° 5′ dissolves 136, and at 16°, 141 parts.

Five parts and a half of alcohol of the specific gravity =0.85 at 12° 5′, and from 39 to 40 parts of pure alcohol at the same temperature, will dissolve one part of the ioduret of potassium: in both cases, more of the ioduret will be dissolved if heat be applied.

IODURETTED HYDRIODATE OF POTASS.

M. Baup has ascertained that the ioduretted hydriodates are combinations in fixed and determinate proportions; so that a solution of hydriodate of soda or potass known to be capable of still farther dissolving iodine, can under any circumstance, combine with a quantity of iodine equal to that which it already contains (nearly three-fourths of its weight, or : : 76,5 : 100.)

Hitherto a solution of the ioduretted hydriodate of potass, commonly in water, is the only preparation that has been employed in medicine: but the simple hydriodate is preferable.

ACTION OF IODINE ON THE ANIMAL SYSTEM.

Shortly after the publication of his beautiful work on iodine, M. Gay-Lussac sent a quantity of it to M. Magendie, for the purpose of trying its effects on animals. Some

experiments were immediately instituted, and the tincture of iodine was introduced into the veins, to the extent of a *gros*, without any apparent effect. Several dogs were also made to swallow it, but the only effect produced was that of vomiting.

Perceiving this to be the case, M. Magendie then took 5 *grammes* of the tincture himself, and nothing was perceptible beyond a disagreeable taste, which continued for several hours, but at length went gradually off. He has recently seen a child, four years old only, who took the same quantity by mistake—the lips and tongue became of a yellow colour, but no serious consequences ensued.

Besides the therapeutical properties of iodine, one of its most remarkable effects, when it has been continued some time, is the diminution of the mammæ in the female, and of the testicles in the male; M. Magendie has not seen this effect himself, but has been assured of its frequent occurrence in Switzerland.

CASES IN WHICH THE PREPARATIONS OF IODINE MAY BE EMPLOYED.

Dr. Coindet of Geneva, was the first who employed this substance as a medicine, and used it with remarkable success in the treatment of goitre. It has since been used both in Switzerland and France by several physicians; and it would appear from their experience, that iodine is an efficacious remedy in a disease that is sometimes so very obstinate.

Success is most commonly to be looked for in recent cases, and when the individual is young; several instances have, however, occurred, in which old, hard, and very large goitres have yielded to this remedy; but in such instances as the course of treatment is protracted, it may have an injurious effect on the stomach—in order to obviate which, it has been an object to introduce the remedy in some other way, particularly by means of friction. A curious fact is recorded by Mr. W. Rickwood,* of the cure, at least

* Lond. Med. and Phys Journ. August, 1829.

the diminution of a goitre, in a woman seventy years of age.

Iodine has been likewise employed in the treatment of scrofula with equal appearance of success. M. Baup has succeeded with very old scrofulous ulcers; and M. Magendie himself has cured very considerable glandular enlargements by its employment.

In the report of the Polyclinical Institute of Berlin, for the years 1820, 1821, and 1822, MM. Hufeland and Osan, after reporting favourably of the efficacy of the tincture of iodine, and of hydriodate of potass, in the cure of goitre, add that they have employed the same preparation with advantage in schirrus and cancer of the uterus. Dr. Wagner is confident that he saw benefit from the employment of iodine in the case of a tumour, which he considered cancerous, situated in the neighbourhood of the jaw. Dr. Hannemann* is satisfied that iodine exerted a remarkable influence on a cancer of the uterus in the most advanced stage. There was a communication between the vagina and the abdominal cavity, so that a cure was not practicable; but the nature of the affection was considerably ameliorated. Dr. Zinck has seen two cases of fluor-albus cured by these preparations.

A case of cure was commnicated to Dr. Gairdner, by Professor Maunoir, of Geneva. A child laboured under a considerable white-swelling of the knee, and could not walk without crutches. Blisters, leeches, and sedative lotions, of every description, had been employed, when the tumour was rubbed night and morning with a piece of iodine ointment, about the size of a nut; while the tincture was given internally in small doses. After a few weeks a perfect cure took place.

Two memoirs have been published by M. Zinck on the abuse of iodine taken internally, from which it appears that if persisted in for too long a time, it may produce inflammation of the stomach; but this seems to have been owing to the impatience of the parties for a rapid cure, in consequence of which the remedy was taken imprudently.

* Journal der practischen Heilkanse.

This gentleman remarks, "as soon as the tincture of iodine became known as a cure for goitre, it was used to an enormous extent at Lausanne; it was pushed so far, that I may say, without exaggeration, the tincture of iodine bottle occupied the place of the bonbonniere (sweet-meat box), for I have seen persons carrying it about with them. With few exceptions it was in general use; some took it to prevent this dreadful affection. This medicine was procured at the shops without physicians' prescriptions. I have calculated, with M. Biscoff, apothecary of our city, that at least he has used 10 pounds of iodine to prepare sufficient tincture for one year's consumption; and other apothecaries have also sold a like quantity. This mania for iodine had some victims; but, in general, much less mischief was done than might be expected, from the incautious manner in which the tincture was used."

Dr. Gairdner has published in England a very interesting memoir on the effects of iodine on the animal economy, and on its advantages in the treatment of goitre, and scrofulous and tuberculous affections of the thorax and abdomen. We shall observe, that iodine but rarely produces those unpleasant effects ascribed to it by this author; nor will it, unless administered to the extent of which he speaks, in the case of a young student who wished to cure his sister of a goitre.*

Dr. Barron appears to have employed the remedy with some success in the treatment of scrofulous phthisis, and certain other tuberculous affections. These first attempts impose the necessity of collecting additional facts, for the purpose of ascertaining to what extent the efficacy of iodine may be relied upon when phthisis has not made much progress.

The late Mr. Haden, in the English translation of this Formulary, also reports a case of phthisis supposed to have been cured by iodine.

M. de Fernon employed the following mixture with good effect, in the case of a young phthisical female, giving her 5 *grammes* every hour.

* Vide Appendix.

Take of	Lettuce water	4 onces.
	Solution of hydriodate of potash	15 drops.
	Medicinal prussic acid	10 to 12 drops
	Syrup of marsh mallows	1 ounce.

Mix.

Or the prussic acid and syrup of marsh-mallows may be replaced by an ounce of cyanic syrup.

Dr. Baron (whom we have already mentioned), in his Treatise on Tuberculous Diseases, reports a case of encysted dropsy of the ovarium, in which the employment of iodine was followed by the most prompt and marked success. Dr. Gairdner, who quotes this fact in his work, and says that he recommended the remedy in a similar instance with great advantage, gave it in several cases of ascites, but without any benefit.

Dr. Coindet praises iodine as a powerful emenagogue; an opinion which has been confirmed by Professor Brera,* and other physicians. In fact, this last-named gentleman has employed the remedy still more extensively than Dr. Coindet. Besides goitres and suppressions of the catamenia, which have been cured by it, he mentions several cases of indurated glands, tabes mesenterica, chronic dysentery, and hæmoptöe supervening to suppressed menstruation, laryngeal phthisis, leucorrhœa, syphilitic enlargements, &c., as having been also cured by it. Probably the professor too generally unites other substances with the preparations of iodine, when he ascribes the merit to the latter; they should therefore be employed in similar cases with caution. M. Brera, however, is not the only one who has given a favourable opinion of the use of iodine in tabes mesenterica. Mr. Callaway, a distinguished English surgeon, has derived the best effect from it in scrofulous cases and in enlarged mesenteric glands.

M. Magendie gave iodine in a case represented to him to be suppressed catamenia; at the end of three weeks, abortion was the result.

Iodine has also been recently employed in the treatment of syphilitic buboes, and in blennorhagia. M. Richond, of the military hospital of Strasburg, has in particular

* Saggio clinico Sull' iodo, &c. Pad. 1822.

tried it in these two complaints.* He generally gives 15 drops of the tincture the first day, in the morning; 20 to 25 the second, and 30 the third day. He then adds 15 drops in the evening, and goes on increasing, till the dose amounts to 30 drops morning and evening. This quantity is continued for three or four days, until it is augmented to 50 or 55 drops night and morning. If no irritation of the stomach takes place, the patient often feels a sense of heat in the pharynx, which soon goes off. Sometimes there are slight colics, headaches, dryness and redness of the tongue, when it becomes necessary to suspend the medicine; returning to it, however, again. The most proper dose is 30 drops morning and evening. All Richond's patients have been robust soldiers, and not easily excited.

MM. Gimelle† and Sablairolles‡ have adduced some cases in confirmation of the opinion of Coindet and Brera, as to the virtues of this remedy in leucorrhœa. The former has also cured some cases of herpes by it. M. Eusebe de Salle has employed frictions of the ointment of hydriodate of potass and iodine in pills, for chronic obstructions of the liver, to which Europeans are subject in tropical climates.

M. Ronpp,§ the veterinary surgeon attached to the depôt of stallions at Abbeville, wished to try the hydriodate of potass in the acute stage of glanders; and gave from 9 to 14 grains during a month to a horse, rubbing in the ointment at the same time. On this occasion the trial did not succeed; and indeed the fever seemed to be aggravated by the treatment. Perhaps the dose was too large, and possibly the animal suffered under too great a disorganization of the lungs, of the mucous membrane, and the subjacent bone, to render a cure probable.

At the close of the year 1822, the Genevese and Swiss physicians had abandoned their original confidence in the preparations of iodine. They imagined that serious inconveniences had followed their employment, such as chronic

* Arch. gen. de Med. March, 1824.
† Revue Medicale VII. 249.
‡ Journ. Univ. des Sc. Med. Oct. 1825, and Bulletin des Sciences Med. Feb. 1824.
§ Journ. Gen. de Med. April, 1824.

inflammations of the stomach, considerable and rapid emaciation of the whole body, but most remarkably of the mammæ. The reason has been already assigned. Such accidents have never occurred in M. Magendie's own experience, unless where the doses have been unduly great; but this does not remove the necessity for circumspection in the exhibition of these new remedies. M. Magendie seems to think that some of these unfavourable results have been owing to a difference in the weights, leading to a variation in the strength of the tincture.

MEDICINAL EMPLOYMENT OF IODINE.

TINCTURE OF IODINE.

Take of Alcohol at 35° ..... 1 once.
Iodine ..... 48 grains.
Mix.

This tincture should not be prepared too long before it is wanted, as it is apt to deposite crystals of iodine; besides which, it is to be feared that the iodine may attract a portion of the hydrogen of the alcohol, and then become converted into an hyoduretted hydriodic acid.

The tincture is less frequently employed than the two following preparations. It is given to adults in the dose of from 4 to 10 drops, three times a day, in a glass of sugared water; the quantity may be augmented progressively to 20 drops, which contain about one grain of iodine, three times a day.*

IODURETTED SULPHURIC ETHER.

Take of Sulphuric ether..... 1 gros.
Pure iodine..... 6 grains.
Dissolve.

Thirty drops contain one grain of iodine; and the patient can scarcely bear more than 10 drops at a time.

* A drop of the tincture weighs only two thirds of a grain; whereas a drop of the solution of the hydriodate will weigh more than a grain; even a grain and a half, or two grains, if the solution be *ioduretted*. This difference, therefore, must be borne in mind when the doses are regulated by *drops*.

SOLUTION OF HYDRIODATE OF POTASS.

Take of Hydriodate of potass..... 36 grains.
Distilled water..... 1 once.
Dissolve.

This solution is still capable of dissolving iodine, and of thus forming an ioduretted hydriodate of potass.

If we wish to procure the solution called Coindet's, 10 grains of pure iodine must be added to the solution of the hydriodate of potass described above.

These two preparations, whose mode of exhibition is the same as that of the tincture of iodine, are employed, as well as it, in the treatment of goitre and scofula; in the latter case, some tonic is generally combined with it.

M. Magendie has for some time made use of the solution of hydriodate of potass, both in his hospital and private practice. He is confident that the dose of this solution may be increased to three *gros* per diem without any unpleasant consequences; debilitated and very nervous women have taken this quantity for many weeks, without the least appearance of derangement in any function.

In this dose, two cases of cancer of the tongue recovered in the space of a fortnight, in the incurable wards of L'Hospice de la Salpetriere. The women were affected with this disgusting and horrible disease for many years, and admitted into L'Hospice as incurables; one still remains there, having been three months under treatment, and is going on very well. In the same place, a woman who had for a long time suffered under ulcerations of the tongue, has just received a complete cure from the use of the hydriodate of potass.

Scorbutic swellings of the gums disappear in a few days, by giving half a *gros* of the solution per diem. In these cases, probably the solution acts in a manner analogous to its operation in goitres, viz. by constringing the ultimate ramifications of the vascular system; with this view, it is employed by M. Magendie in a high dose against hypertrophies of the ventricles of the heart.

OINTMENT OF HYDRIODATE OF POTASS.

Take of Hydriod. of potass..... ½ gros.
Axunge..... 1½ once.
Mix.

This may be used, to the extent of half a *gros*, night and morning, in the way of friction, upon a goitre or glands enlarged from scrofula. At the end of a week, the quantity may be increased to a *gros* or more, according to the age of the patient, and the extent of the tumour.

Sometimes, by these means, the complete resolution of tumours is effected, which could not be removed entirely by saline solutions. This ointment has been successfully used in various cases of enlargement of the testicles, which had resisted other means. Sometimes, however, mere friction will not do, and recourse must be had to both modes of exhibition; but in general more advantage seems to be derived, in scrofulous affections, from the saline solutions.

When frictions are employed in the treatment of goitre, the action of iodine may sometimes be advantageously promoted by emollient fomentations or leeches. Occasionally after the first inunction, the swelling, instead of becoming softer, increases in hardness, and is slightly painful: this local irritation may be in general removed by a few leeches, after which the efficacy of the iodine will be displayed in a very remarkable manner.

The activity of this ointment may be increased by adding from 10 to 15 grains of pure iodine, to form what is called Ointment of ioduretted hydriodate of potass.

OINTMENT OF IODATE OF ZINC.

Dr. Uré* recommends friction with the following formula, as a substitute in some cases for the foregoing ointment.

Take of Iodate of zinc..... 1 gros.
Axunge..... 1 once.
Mix.

A *gros* of which may be rubbed upon the tumour twice a day.

* Dict. of Chemistry. 2d. edition.

IODURETS OF MERCURY.

TO PREPARE PROTO-IODURET OF MERCURY.

This has of late been employed in syphilis; and may be prepared by taking 100 parts of proto-nitrate of mercury in crystals, and dissolving them in 400 parts of water. This being filtered, a solution of hydriodate of potass is added to it, until precipitation ceases. We thus obtain a greenish-yellow pulverulent precipitate, which, being thrown on a filter, is to be carefully washed with distilled water, until the water derived from it will no longer yield a black precipitate with potass. We are then to dry, and preserve it in a close vessel, shaded from the rays of the sun. This proto-ioduret is yellow, insoluble in water, and exerting no action on this fluid; it is also volatile. According to Dr. Thomson, 162 parts contain 62 of iodine, and 100 of mercury—or 25 of mercury, and 156 of iodine.

TO PREPARE THE DEUTO-IODURET.

Take of the deuto-chloruret (corrosive sublimate) of mercury 70 parts, and 100 of the hydriodate of potass. Dissolve each of these separately in a sufficient quantity of distilled water; filter the two liquors, and unite them by small quantities; there will be immediately a precipitation of a red powder, which is to be collected on a filter and washed, in the most careful manner, with distilled water, until that which passes through the filter has no longer any taste.

The precipitate being dried is to be reduced to powder, and put into a bottle, and kept from exposure to the rays of the sun. This deuto-ioduret is very soluble in the hydriodate of potass and in mercurial salts, so that care must be taken not to apply an excess of either of them. Acids and alcohol dissolve the precipitate. This preparation contains 250 parts of mercury and 312 of iodine.

Hydriodic acid may be substituted for hydriodate of potass in the preparation of these iodurets.

MEDICINAL EMPLOYMENT OF THE IODURETS OF MERCURY.

OINTMENT OF THE PROTO-IODURET OF MERCURY.

Take of Proto-ioduret of mercury.. 20 grains.
Axunge..... 1½ once.
Mix.

This ointment has been highly recommended in the treatment of inveterate venereal ulcers, in which it is said to accelerate the cicatrization.

OINTMENT OF THE DEUTO-IODURET OF MERCURY.

Take of Deuto-ioduret of Mercury. 20 grains.
Axunge..... 1½ once.
Mix.

This preparation is more active than the preceding, and is therefore to be used in smaller quantity.

TINCTURE OF THE DEUTO-IODURET OF MERCURY.

Take of Alcohol at 36°..... 1½ once.
Deuto-ioduret of mercury.... 20 grains
Mix.

Twenty-six drops of this tincture are nearly equivalent to one-eighth of a grain of the deuto-ioduret itself: it may be given to the extent of 10, 15, or 20 drops in a glass of distilled water, as common water readily decomposes it. We are assured that it has succeeded in scrofulous complaints, complicated with syphilis.

SULPHURIC ETHER WITH DEUTO-IODURET OF MERCURY.

Take of Sulphuric ether..... 1½ once.
Proto, or deuto-ioduret of mercury 20 grains.
Mix.

This being a more active preparation than the preceding, must be administered in smaller doses.

PILLS OF THE DEUTO-IODURET OF MERCURY.

Take of Deuto-ioduret of mercury.. 1 grain.
Extract of juniper..... 12 grains.
Liquorice powder, q. s.
Mix.

To be made into eight pills: two to be taken at first morning and evening: augmenting the dose subsequently to four, at the same periods.

PILLS OF THE PROTO-IODURET OF MERCURY.

Take of	Proto-ioduret of mercury..	1 grain.
	Extract of juniper.....	12 grains.
	Liquorice powder, q. s.	
Mix		

To form 8 pills; dose as in the preceding formula.

LUPULINE.

This substance resides in the humulus lupulus, and we are indebted for its discovery to Dr. Ives of New-York. It has since been described in France by M. Planche, and more recently by MM. Chevalier and Payen, under the name of Yellow Matter of the hop.

It presents itself in the form of small, shining, yellowish grains, which cover the base of the strobiles of the hop—it is of a golden yellow colour, of an aromatic odour, and pulverulent.

Upon analysis it is found to consist essentially of resin, a little volatile oil, and a bitter principle: to which last the term lupulus seems with most propriety to belong. Its taste is extremely bitter—it is soluble in water, alcohol, and ether, to all which menstrua it imparts its bitterness.

ACTION ON THE ANIMAL SYSTEM.

Dr. Ives considers it at once aromatic, tonic, and narcotic—points upon which M. Magendie has ascertained nothing conclusive. He has made a variety of experiments upon animals, both with lupuline in substance, and with different preparations of it, but he has never observed any narcotic effect, although this is one of the properties most readily manifested in the animals.

MEDICINAL EMPLOYMENT.

POWDER OF LUPULINE.

Take of Lupuline.....1 part.
White sugar in powder.....2 parts.

Bruise the lupuline first in a porcelain mortar and gradually add the sugar. Mix them accurately.

PILLS OF LUPULINE.

Lupuline any quantity: let it be beaten into a pilular mass and divide.

This substance requires no adjuvant, for the purpose of forming a mass.

TINCTURE OF LUPULINE.

Take of Powdered lupuline..... 1 once.
Alcohol at 36°.....2 onces.

Digest for six days in a close vessel; strain, press it strongly, filter, and add a sufficient quantity of alcohol of the same strength to obtain 3 ounces of the tincture.

EXTRACT OF LUPULINE.

This may be prepared either by a watery infusion or by decoction. In the former case it is bitter and aromatic; in the latter equally bitter, but less aromatic, and retains resin.

SYRUP OF LUPULINE.

Take of Tincture of lupuline....1 part.
Simple syrup..... 7 parts.
Mix.

When the tincture of lupuline is mixed with the syrup, this latter separates in a state of minute division, giving the mixture the appearance of orgeat. It is therefore necessary that the bottle should be shaken immediately before it is used.

The doses of these preparations are not yet fixed in a

precise manner; but as lupuline possesses no poisonous quality, the dose may be easily determined by the practitioner.

OIL OF CROTON TIGLIUM.

This oil, which is of an orange-yellow colour, possessing a strong peculiar smell, very acrid, and spicy taste, something like cinnamon with a castor oil flavour, is extracted from the seed of the croton tiglium, a shrub of the family euphorbiæ, which grows in the East Indies. From the recent researches of M. Caventou, he is confident that the croton tiglium is the same shrub which produces the seeds known in commerce by the name of pignon of India, which MM. Pelletier and Caventou analyzed in 1818, under the name jatropha curcas. M. Caventou has supported this opinion from his chemical experiments, which have proved to him that the oil obtained from the pignons of India, differs in no respect from the croton oil procured directly from London. In fact, the same odour, the same colour, the same flavour, the same mode of action, with chemical reagents, and also the same therapeutic energy, according to the observations made in the hospitals by MM. Récamier, Bally, and Kapeller.

It is cultivated at Malabar, Ceylon, and the Moluccas, on account of its medicinal properties. The oil of croton was introduced into Europe in 1630, and was employed in the interior of this continent by some physicians with success. In 1632 Artus Gyselius extolled it in dropsy. In the herbarium Amboinense of Rumphius, published at Amsterdam in 1750 by Burmann, a description of the croton is contained; the seeds of which, says the author, yield on expression, an oil, which when taken in the dose of one drop in Canary wine, was at that time a common purgative. The medicine had, however, entirely fallen into neglect in Europe, when Mr. E. Conwell, of the English East India Company's service at Madras, recalled attention to it. It is generally employed in India, and has been lately introduced into England.

MODE OF PREPARATION.

The mode of preparing the oil of croton in India is not known; it appears, however, to be obtained by expression or by boiling. Its preparation has not yet been attempted in France, from the difficulty experienced in procuring the seeds of the croton tiglium. On digesting in sulphuric ether 100 parts of the bruised kernels, placing the whole on a filter, carefully covered during the whole continuance of the filtration, and washing the residuum with a sufficient quantity of ether, Dr. Nimmo of Glasgow found that there remained forty parts, and that sixty had been dissolved.

By this process, from 300 grains of the seeds, from which 108 grains must be deducted for the envelope, when 192 grains of the kernels will remain, he obtained two drachms of an oil which had the taste and medicinal properties of the common oil of croton.*

An alcoholic solution may also be prepared, either by pouring alcohol upon the seeds or upon the oil itself: but Mr. Conwell does not point out, in the thesis which he sustained at the faculty of Paris, the proportions in which this solution, which has the same properties as the oils, should be made: that which he prepared must have been less active than the oil, for he administered it in the dose of half a drachm. According to Dr. Nimmo, the activity of the oil of croton would seem to be owing to an acrid resinous principle, soluble in ether, alcohol, and the fixed and volatile oils. From the experiments of this physician, 100 parts of the kernels of the croton tiglium contain of

Acid principle	27
Fixed oil	33
Farinaceous matter	40
	100

100 parts of the oil of croton contain

Acrid principle	45
Fixed oil	55
	100

* The oil of croton, prepared after the process of Dr. Nimmo, is to be obtained only at Messrs. Waugh's, Regent-street—TR.

MM. Vauquelin and Pelletier have made some experiments for the purpose of isolating the active principle of the oil of croton, but they have not succeeded.

M. Caventou has obtained the oil of croton tiglium, by means of the action of alcohol at 38° upon the kernels of the seeds reduced to a paste. He allows it to macerate 48 hours and filters: he adds a second and a third quantity of alcohol upon the paste, which he afterward submits to a strong pressure. He places the alcoholic macerations in an alembic, draws off the alcohol by distillation, the oil which remains in the alembic is filtered through paper, and preserved in a stopper-bottle.

The quantity of oil the seeds yield is fifty per cent. From the researches of M. Caventou, it would appear that jatrophic acid is not the principle in which the drastic power of the croton oil resides.

ACTION ON THE ANIMAL SYSTEM.

When a drop of this oil is placed upon the tongue, in a few moments a disagreeable sensation of heat is produced, which extends to the fauces, and continues for some minutes, to remove which one or two spoonfuls of cold water should be taken; this forms an objection to the administration of the oil by itself. Mr. Conwell having sent some to M. Magendie, he tried its effects upon animals, when he found the oil to be purgative in a very small dose, such as a drop, or even half a drop. In a larger quantity it proved powerfully drastic, and occasioned violent inflammation of the intestinal canal, attended by repeated vomiting, and continual purging. When injected into the veins, it produced, according to the dose, either simple purgation, inflammation of the intestinal canal, or death.

From observing these effects, he did not hesitate to employ it as a medicine; it was given to several patients, both male and female, at the Hôtel-Dieu with very satisfactory results. One or two drops, mixed with half an ounce of syrup, purged copiously and without griping; this was its effect in fifteen cases labouring under different affections. The effects appeared to be so excellent, that

many of the pupils at the hospital desired to try it upon themselves; those who made use of it expressed their satisfaction with its operation. It is now frequently used in the Hospice de la Salpétrière, and always with success. In private practice, no accidents have been observed from its use.

Mr. Conwell has seen it produce nausea and vomiting in some individuals. When vomiting occurs, the purgative effect does not take place.*

Mr. Conwell states, that the odour of the oil of croton, several times respired over a bottle containing sixteen ounces, was sufficient to purge a young girl; an adult having made the same experiment, suffered only from nausea.

The effect of the oil of croton is very rapid, frequently supervening at the expiration of half an hour. Besides the alvine evacuations, the secretion of urine appears to be considerably augmented.

MM. Recamier, Kapeler, and Bally have made numerous experiments with the oil prepared by M. Caventou; they have always seen that one or two drops have been sufficient to produce from twelve to fifteen, and even twenty alvine evacuations. Nevertheless, they have seen it produce the inconvenience of vomiting, like that which is procured from England.

MEDICINAL EMPLOYMENT.

The oil of croton may be employed as an ordinary purgative, when there does not exist any symptoms of irritation about the stomach or intestinal canal; in old persons, in the same circumstances as veratrine; but the oil of croton ought especially to be preferred, when common purgatives have been administered without success in apoplexies, in dropsies, and when mechanical or other obstacles oppose the action of usual purgatives; but above all, when it is requisite to produce action on the bowels speedily.

* Dr. Dunglison observes, in a former edition of this work, which he translated, that vomiting with purging does in many cases occur from the use of this oil. This agrees with the translator's experience.

Dr. Ainslie, physician at Madras, published in that city in 1813, a work on the materia medica, in which he recommends the external use of croton oil in rheumatic affections.

D. Kinglakę cites many cases of obstinate constipation, which he has cured by a single drop of this oil, given in the form of a pill. In this manner he cured a patient labouring under colica pictonum.*

It is commonly given in doses of one, two, or three drops, in half an ounce of syrup of gum. Mr. Conwell recommends the following formulæ:

Take of	Alcoholic solution.....	½ gros.
	Simple syrup.....	each 3 gros.
	Mucilage of G. Acaciæ ...	each 3 gros.
Mix.		

It has been already stated that Mr. Conwell has not mentioned in what proportion the active principle enters into the alcoholic solution which he employs; it is probable, however, that it is prepared by saturation. Till we have more information on this point, we had better confine ourselves to the use of the oil.

The same gentleman has used the oil by means of friction about the umbilical region. Four drops used in this manner have produced a purgative effect. A slight eruption also appeared on the part.

SOAP OF THE OIL OF CROTON.

The therapeutic administration of the oil of croton has inconveniences arising from the variation in the sizes of drops; to obviate which, M. Caventou has prepared a soap according to the following method: Two parts of the oil, and one part of liquid caustic soda of the French pharmacopœia, are to be triturated together without heat. When the compound has acquired a sufficient consistency, it is poured into paste-board moulds; after a few days, the soap is to be taken out in slices, and placed in a stopper bottle with a large mouth.

Mr. Bally has given this soap in doses of from two to

* Bulletin des Sciences Médicales, Février, 1824, p. 145.

three grains, sometimes diffused through water, at others mixed with sugar, and in some cases as pills ; the effect has been the same as that of the oil of croton.

PIPERINE.

This substance was discovered in the black pepper* (piper nigrum), by M. Œrstaedt, who believed it to be a vegetable alkali.

M. Pelletier has since made an analysis of it, and proved that the piperine, the crystalline matter of the pepper, is not a vegetable alkali, but that it has a considerable analogy with the resins,† and is of a peculiar nature.

This substance has lately been employed in Italy as a febrifuge. M. Magendie has not yet confirmed, by his own experience, the facts which have been stated by M. Dominique Meli,‡ respecting its properties.

MODE OF PREPARATION.

M. D. Meli gives the following instructions for the preparation of piperine :—Let two pounds of bruised black pepper be digested at a gentle heat, in three pounds of alcohol at 26°. This must afterward be raised to ebullition ; suffered to rest and cool ; when it must be decanted, and the operation repeated with fresh alcohol. The two solutions must be mixed, and two pounds of distilled water, and three ounces of hydrochloric acid be added to them. The liquor becomes troubled, and a precipitate of a deep gray colour is thrown down, which is in a great measure composed of fatty matter. The deposite being separated, very beautiful crystals may be collected on the filter and sides of the vessel : these are the piperine. On adding water until this liquid is no longer rendered turbid, a fresh quantity is obtained. This process is the same as that pointed out by M. Pelletier. In a memoir published by this gentleman, he states that he had also ob-

* Journal de Physique, No. 2, 1820.
† Examen Chimique du poivre, par J. Pelletier, 8vo. Paris.
‡ Muali unio, di Medicina, tome xxvii. p. 161, et tome xxviii. p. 22.

tained the crystalline matter of the pepper by the following method: after having exhausted the pepper by alcohol, and evaporated the alcoholic tinctures, a fatty or resinous matter is obtained; this must be subjected to the action of boiling water, which must be repeated, until it passes off colourless. Then, by dissolving this fatty matter (thus purified by washing in alcohol) by the aid of heat, and leaving the solution to itself for some days, a multitude of crystals are obtained, which may be purified by solution in alcohol and ether, and by repeated crystallization. The alcoholic mother-waters, left to themselves, will afford fresh crystals. This crystalline matter is piperine. The crystalline matter of the pepper presents itself under the form of prisms with four faces; two of which, parallel to each other, are evidently broader: the prism is terminated by an inclined surface. This substance is totally insoluble in cold water: boiling water dissolves a small quantity of it, which is precipitated on cooling.

It is very soluble in alcohol, less so in ether, and more so in hot than in cold.

M. Pelletier finds that piperine bears much analogy with the resin of cubebs; which M. Vauquelin compares with the balsam of copaiba: the piperine in cubebs, however, does not possess any crystalline property.

CASES IN WHICH PIPERINE MAY BE ADMINISTERED.

According to M. D. Meli, piperine has the same febrifuge properties as the alkalies of the cinchonas. At the hospital at Ravenna he has cured a great number of cases of fever with it, and he even goes so far as to affirm that its action is more certain and more prompt than that of the sulphate of quinine. Piperine ought to be employed in a much smaller dose than the sulphate of quinine. Intermittent fevers are the only diseases in which it has as yet been employed. It might also be used in gonorrhœa in place of the cubebs. According to M. D. Meli, the acrid oil of the pepper possesses the same febrifuge virtues as the piperine, but in a less degree. This is doubtless

owing to its always retaining a certain quantity of the crystalline matter.

UREA.

Urea, the immediate principle of the urine of mammiferous animals, was discovered by Rouelle Cadet, and studied in most of its properties by Fourcroy and Vauquelin.

PHYSICAL AND CHEMICAL PROPERTIES.

The purest urea that can be obtained presents itself under the form of elongated lamellæ ; it is colourless, transparent, brilliant, and pearly in aspect ; its taste is fresh and sharp ; its odour analogous to that of urine. When it is exposed to an increasing heat, it first melts, then swells up, and soon decomposes, furnishing a little charcoal, a great quantity of subcarbonate of ammonia, and an inflammable gas of an insupportable odour. It furnishes but very little or no water, acetic acid, prussic acid, oxide of carbon or oil, which distinguishes it from all animal substances.

Thrown upon burning charcoal, it resolves itself into a white vapour, which has a strong ammoniacal smell.

When urea is exposed to the atmosphere, it does not attract any moisture ; nevertheless, it is very soluble in water and in alcohol.

An aqueous solution of urea left to itself gradually decomposes and becomes ammoniacal ; nitric, nitrous, and chloric acids only alter the solution of urea at the ordinary temperature.

The infusion of galls and the alkalies produce no precipitate with it ; but if it be heated ever so little with alkaline substances, the urea is converted into ammonia, carbonic acid, and acetic acid.

Urea consists of

Oxygen	28.5
Azote	32.5
Carbon	14.7
Hydrogen	11.8

M. Bernard has given in his thesis an analysis, which

differs a little from the above; the proportion which he assigns to the different constituent parts of urea, are as follows:

Oxygen	26.4
Azote	43.4
Carbon	19.4
Hydrogen	10.8
	100.0

PROCESS FOR OBTAINING UREA.

According to Mr. Thenard, of all the methods of obtaining urea the following is the best:

Treat urine evaporated to the consistence of syrup, by its volume of nitric acid at 24°; agitate the mixture, and place it in an ice-bath, in order to harden the crystals of super-nitrate of urea; wash them in water at 0, drain them, and compress them between leaves of filtering paper; when they are thus separated from foreign matters, dissolve them in water, and add to the solution subcarbonate of potass, which takes up the nitric acid, and sets the urea at liberty. Evaporate this new liquor by a gentle heat, nearly to dryness; treat it with alcohol, which dissolves the urea only? concentrate the solution, and the urea will crystallize.

ACTION OF UREA UPON THE ANIMAL SYSTEM.

Urea does not exist in any animal fluid but the urine, unless it be in the blood of animals which have been deprived of their kidneys.

M. Segalas, desirous of ascertaining if animals nephotomized would die from the accumulation of urea, or by the effects of the other elements of the urine, injected into the veins of several dogs quantities of urea, gradually increasing; all the animals survived, and their blood being analyzed, not an atom of urea could be detected. This gentleman observed that the urea thus injected into the veins acted in a singular manner upon the urinary organs. Although the diuretic action of urine upon man has been

confirmed by M. Segalas himself, and by M. Fouquier, M. Magendie states that urea does not appear to him to possess that degree of activity which M. Segalas appears disposed to attribute to it.

This physician has given urea in diabetes, but without success. The composition of morbid urine has not varied; but we may use urea to replace the other diuretics when they begin to lose their effect by too long continuance.

MEDICINAL EMPLOYMENT.

Urea has been given in distilled water sweetened with sugar; it may be given to the extent of several *gros;* it will be proper to commence by giving but 25 or 30 grains.

OIL OF EUPHORBIA LATHYRIS.

Euphorbia lathyris, known under the name of epurge (spurge), is an indigenous annual plant. It contains, like all the euphorbiæ, an irritating and caustic juice. Its seeds have lately been proposed as substitutes for ipecacuanha. Dr. Carlo Calderini* obtained an oil from the seeds of this plant, which may be used with advantage for the oil of croton tiglium, and which like it acts in a very small dose.

PROCESS FOR OBTAINING THE OIL.

When the seeds are very ripe, they are to be dried and separated from the black ones, which will turn rancid; the oil is obtained by simple pressure: 14 *onces* of seeds yield six *onces* of very pure oil.†

PHYSICAL AND CHEMICAL PROPERTIES OF THE OIL OF EUPHORBIA LATHYRIS.

This oil very much resembles castor oil; it has the same colour, it is not quite so dense, it is void of odour, it

* Giornale di Farmacia Chimica. Anno 1824, f. 553.

† The oil of euphorb. lathyr. is kept by Mr. Noakes, Oxford-street.

is not acrid, nor has it an unpleasant flavour; it is very transparent.

With time, and especially if the weather be warm, it becomes turbid and rancid, then it has a pungent taste. It burns with a beautiful white flame, without producing smoke; it does not dissolve in alcohol even when highly rectified; it forms soap with the alkalies.

ACTION ON THE ANIMAL SYSTEM.

The action of this oil is purgative, its effect is very certain and prompt: it is to be considered, says the Italian author, as a very mild purgative: it does not produce vomiting, colic, or tenesmus; it may be administered even in dysenteries, when there is irritation in the intestinal canal, with as much benefit as the pulp of tamarinds.

CASES IN WHICH IT MAY BE ADMINISTERED.

It has been employed in quotidian gastric fever, in dysentery, even where there were marked symptoms of abdominal irritation; and when this disease was attended by derangement of the prima via, in slight anasarca consequent to intermittent fever, and in fact in all cases in which it is desirable to purge gently, and with a small dose of medicine.

MODE OF PRESCRIBING.

The dose of the oil of spurge for adults is from four to eight drops.

To children of two or three years of age, a dose of three drops in chocolate. To very irritable subjects, an emulsion may be given made with eight drops of the oil, some aromatic water, and syrup of orange-peel, this has in such cases produced very good effects.

Water sweetened with sugar forms a very good vehicle for the oil.

LACTUCARIUM.

The lactucarium of Dr. Duncan, of Edinburgh, such as is prepared by Mr. Probart, of London,* and the thridace† of Dr. François, are nothing more than the white viscid juice of the garden lettuce (lactuca sativa). The extract is made at the time the plant flowers, and without heat. For some years this has been employed in England, and its properties are described by Dr. Paris in his pharmacologia, and by other English writers on the Materia Medica.

PHYSICAL AND CHEMICAL PROPERTIES.

The white viscid juice obtained from the lettuce by incision is bitter, it concretes and turns brown rapidly; it becomes hard and brittle after the manner of gums, but it easily resumes a pasty consistence if exposed to the free air. If preserved in a well-stopped bottle it disengages a slightly ammoniacal very fugaceous odour.

This juice, evaporated by a gentle heat, preserves the peculiar odour of the plant, and possesses a strong flavour.

When dried, it attracts moisture from the atmosphere; which distinguishes it from the extract of lettuce prepared in the usual way, over the fire; this continues dry when exposed to a free air; lactucarium dissolved in distilled water, and filtered, presents a clear yellow brown solution, which strongly reddens turnsol paper; ammonia produces in it a white flocculent precipitate, which appears to be chiefly formed of phosphate of lime; infusion of nut-galls produces in it likewise an abundant precipitate, as do also the oxalate of ammonia, nitrate of barytes, nitrate of silver, and alcohol in a large proportion; the chloruret of platina produces no precipitate. MM. Caventou and Boulay, were desirous of ascertaining if any particular principle analogous to morphine existed in the thridace, and were not able to discover any.

* See Paris's Pharmacologia, vol. ii. page 23 2d ed.
† Θριδαξ, lettuce.

MODE OF PREPARATION.

Dr. Duncan of Edinburgh has, in the transactions of the Caledonian Horticultural Society, pointed out various methods for obtaining the juice of the lettuce, which he calls lactucarium; he recommends it to be collected on cotton, sponges, or brushes, as it flows when the stem of the plant is wounded; but Mr. Probart, chemist in London, has procured it on a large scale; he thus describes his method:—"I have the cos lettuce planted about eight inches asunder in rows, between which there is sufficient space to enable persons to pass up and down without injuring the plants. I commence my operations just before the plant is about to flower, by cutting off an inch of the stem; the milky juice immediately exudes, and is collected on pieces of wove cotton, about half a yard square. As soon as this becomes charged, it is thrown from time to time into a vessel containing a small quantity of water, which when sufficiently impregnated is evaporated at the common temperature of the atmosphere, by exposure in a number of shallow dishes. The LACTUCARIUM, in a few hours, is found adhering to the vessels in the form of an Extract. but differing from every other in all its sensible properties: this method enables me to collect LACTUCARIUM with great facility and despatch, but it is still attended with considerable expense, as the proportion of milky product is necessarily very small, and the price of the medicine consequently high, and therefore not within the reach of general practice. This consideration led me to make farther experiments, for the purpose of ascertaining whether an EXTRACT might not be obtained from the plant, possessing all the properties of LACTUCARIUM, when administered in large doses, and which could be introduced at a comparatively trifling cost. In prosecuting this inquiry, I found that the plants contain most of the milky juice when they have flowered and the leaves are beginning to assume a yellow hue, and I observed that when cut down, the milky juice assumes for the most part a concrete form, having subsided in the bark of the stalk and in the old leaves, a circumstance which accounts for the extreme bitterness of these parts.

I was naturally led from these circumstances to choose the above period for my operations, and to select those parts only of the plant for my extract, rejecting the substance of the stalk, and the young sprouts. My method of procuring the extract is as follows. I first macerate the parts in water for twenty-four hours, and then boil them for two, after which I allow the clear decoction to drain through a sieve without using any pressure; this is then evaporated, as far as it can be done with safety, and the process is finished in shallow dishes, in the manner above described, for obtaining lactucarium. This extract, which I have called 'Extractum Lactucæ Concentratum,' is of course less powerful than Lactucarium, but it possesses all the properties in larger doses, and it has been found equally useful in a number and variety of cases; a concentrated tincture is also prepared of the juice of the lettuce."

M. Caventou obtains thridace in the following manner: he gathers the plant just before it flowers, and strips off the leaves; the stalks he slightly bruises, and presses out the juice from them, which he evaporates to a proper consistence at a temperature not exceeding 30 or 35 degrees.

ACTION ON THE ANIMAL SYSTEM.

From the observations made by M. François, it would appear that the action of the thridace is sedative; diminishing the rapidity of the circulation, and consequently the temperature of the body; in these respects it differs much from opium.

M. François states that the first dose of this substance produces a strange sensation in the stomach, like cold, but not unpleasant; and this occurs as soon as it is taken. The viscus soon becomes accustomed to its action; therefore to keep up its sensible effect for several days, it is requisite to continue rapidly increasing the dose, and then to omit it for two days; after which it may be recommenced with the dose first given, and which should be for an adult about two grains. If this quantity should not be sufficient to produce sleep, the patient will, nevertheless, pass a tranquil night, and which will not be followed by the narco-

tism, stupor, constipation, and other ill effects, which are so frequently induced by the different preparations of opium.

This physician has counted the pulse of twelve patients by the watch; he has taken the temperature of the body by means of a thermometer placed in the axilla while they were under the influence of thridace, and has found (taking a mean number) that before taking this substance the pulse were 67 in a minute, and during the action of the medicine they were reduced to 60. In some patients the pulse decreased ten or twelve beats in a minute; in one individual the effect was more considerable. A diminution of temperature has been observed of a degree, and in one or two instances of a degree and a half of the centigrade.

CASES PROPER FOR THE ADMINISTRATION OF THRIDACE.

In the month of August 1824, eleven patients were selected from three wards of the Hôpital de la Pitie. M. François ordered them Caventou's thridace: some were affected with rheumatism, some with phthisis, and some were convalescent from acute diseases; none of them were able to sleep, in ten cases it proved a pleasant hypnotic. From the 25th of September to the 24th of October thirty-six patients of the same ward took the thridace; they were all watched with great care. Three were affected with acute rheumatism; eight were suffering under the chronic form of that disease; one was a case of quotidian fever; one of gastro-enteritis; three had organic affections of the stomach; two chronic peritonitis; two chronic irritation of the bladder; three had phthisis pulmonaris; two had hypertrophie of the heart; one an abscess in the arm; the rest, though convalescent, suffered much from pain and want of sleep. They were all relieved more or less by the use of this medicine—many enjoyed that tranquil repose of which they had been for a long time deprived. In one patient contraction of the pupil was observed, similar to what appears in persons who take opium.

M. François reports also that he has cured many cases of gonorrhœa dormientum by the use of this medicine,

continued six weeks or two months : the dose was from two, four, six, and eight grains per diem, divided into two, three, or four doses.

SALTS OF GOLD.

It was about the year 1810, that M. Chrestien, physician at Montpellier, called the attention of physicians to the employment of preparations of gold in medicine, and published in his Methode Iatraleptique the formulæ of the salts employed, since which, many physicians have tried these substances, but not with that success which M. Chrestien obtained.

Four preparations of gold are now employed in medicine.

1. The chloruret or muriate of gold.
2. The chloruret or muriate of gold and soda.
3. The oxide of gold.
4. The oxide of gold by tin, or purple powder of cassius.

MODE OF PREPARING THE CHLORURET OF GOLD.

Take one part of fine beaten gold, cut in small pieces, introduce it into a white glass phial, pour upon it three parts of aqua regia, (composed of one part of nitric acid and two parts of hydro-chloric acid) let them be carefully heated in a very little sand-bath ; the solution of the gold soon takes place. Evaporate the liquor to the point at which the chloric odour may be perceived, which is easily ascertained, for it occurs in a moment after the aqua regia ceases to disengage the nitric acid, the evolution of chlorine which immediately takes place indicates a commencement of decomposition of a small portion of the chloruret which has been formed. Then take the vessel from the fire and leave it to cool. The chloruret speedily assumes the form of a crystalline mass, presenting a great number of beautiful yellow needles. In this state the chloruret of gold is as pure as is required, as it does not contain an excess of hydro-chloric acid, it is not liable to deliquesce, it

may be preserved in a phial merely covered with paper, without any danger of its suffering alteration.

PHYSICAL AND CHEMICAL PROPERTIES.

The chloruret of gold is always very acid, but it does not owe this property to any foreign acid, it belongs to its nature. Its flavour is very styptic and disagreeable, it dissolves easily in water, to which it communicates a beautiful yellow colour; with vegetable and animal substances it produces a purple violet colour; exposed to a moderate heat it passes into the state of proto-chloruret; exposed to a high degree of heat, in a closed vessel, chlorine is disengaged without water, and the metallic gold remains. Two parts of gold ought at least to furnish three parts of chloruret.

MODE OF PREPARING CHLORURET OF GOLD AND SODIUM, OR MURIATE OF GOLD AND SODA.

M. Chrestien, who first employed preparations of gold in medicine, seldom prescribes the pure chloruret of gold; he combines it with the chloruret of sodium, so as to form a double salt. All that we know with certainty respecting this double salt, we owe to MM. Fiquier and Javal.

M. Fiquier prepares the chloruret of gold and sodium by dissolving four parts of gold in aqua regia, evaporating the solution to dryness, pouring thirty-two parts of water upon this product with one part of chloruret of sodium; afterward concentrating the liquor to half its weight, which on cooling affords compound crystals, containing

Chloruret of gold	69.3
Chloruret of sodium	14.1
Water	16.6
	100.0

M. Javal has made similar observations upon the chloruret of gold and potassium.

PHYSICAL PROPERTIES.

These double salts have a beautiful yellow colour, their form is that of long quadrangular prisms ; they attract a little moisture from the atmosphere.

MODE OF PREPARING THE OXIDE OF GOLD.

The oxide of gold which has hitherto been employed by M. Chrestien has been prepared by means of carbonate of potass. The method directed by the codex is as follows :—take any quantity of the chloruret of gold prepared in the method above described, dissolve it in seven or eight times its weight of cold distilled water, introduce the whole into a phial ; or a matrass, if a large quantity be required. Then add gradually to the liquor carbonate of potass, either in crystals or dissolved in a little water, until no more effervescence can be produced, then heat it to very near the boiling point ; a very abundant precipitate, of a gelatinous appearance, will form ; let the liquor cool and filter it, wash the precipitate with tepid water, until the washings yield no sensible precipitate with a solution of nitrate of silver. Remove the oxide from the filter and dry it at a temperature of 60° or 70° Reaumur, preserve it in a well-stopped bottle in a cool dark situation.

The liquor in which the precipitate has been formed, as well as the washings, contains still much gold ; this metal may be precipitated by pouring a sufficient quantity of the proto-sulphate of iron into it.

It will be seen in this process that the capsule of porcelain has not been used, it always becomes coloured at the expense of a portion of the gold : that warming the liquor has been recommended in order to facilitate the precipitation of the oxide : that the method adopted is that which certainly removes the chloruret of potass : lastly, that the temperature at which the oxide should be dried has been pointed out, for want of attention to which circumstance, divided gold might be given for oxide of that metal.

Another process may be used, which is as follows :—take any quantity of chloruret of gold, put it into a phial

of white glass, pour upon it six or seven times its weight of boiling water in order to dissolve the chloruret, and add gradually crystallized barytes until the liquor loses its acidity, which may easily be known by dipping into it a strip of blue turnsol paper; then boil the liquor for a short time, leave it to cool and filter, let the precipitate be well washed with warm water, unite all the washings and evaporate them nearly to dryness; let this product cool, and dissolve the saline mass in water, by this means another quantity of oxide of gold is separated, which may be united with that first obtained; the liquor may be submitted to a second evaporation if judged requisite; these liquors contain but very small quantities of gold, which may be separated by ordinary means.

The oxide of gold remaining on the filter is to be washed with boiling water, until the washings cease to form any precipitate with the nitrate of silver; then washed once or twice with water acidulated with nitric acid; by this means the little subcarbonate of barytes which may have been formed during the operation, and which may remain mixed with the oxide, will be taken up. A few washings with cold water are to be repeated and it will be ascertained that the barytes has been removed when in pouring into them a little sulphuric acid no white precipitate is formed: the oxide of gold thus purified is to be dried in the manner already described.

By this process, which perfectly succeeded with M. Caventou, a quantity of chloruret of gold containing three *grammes* of this metal yielded at least three *grammes* of oxide. Only half this quantity is obtained when the subcarbonate of potass is used in the process, because the chloruret of potassium which is formed, and the alkali in excess, retain a great quantity of the oxide of gold in a state of solution and colourless combination; such is the result of the experiments of MM. Pelletier and Javal.

PHYSICAL AND CHEMICAL PROPERTIES.

The oxide of gold, in the state of hydrate, is yellow, but anhydrous it is violet, approaching to black. From ob-

servations that have been made in the drying of this oxide, it is ascertained that it does not entirely dissolve in the hydrochloric acid, it always leaves a residue, very weak indeed, but which is demonstrated, by one part of the oxide being reduced to the metallic state in drying. Sulphuric acid and nitric acid, dilute or undilute, have no action upon the oxide of gold. This property may serve to isolate oxides of the same colour, that may have been mixed with it.

MODE OF PREPARING THE OXIDE OF GOLD BY MEANS OF TIN.

To obtain this substance, first dissolve any quantity of chloruret of gold in sixteen times its weight of cold distilled water, then prepare a weak solution of proto-hydrochlorate of tin acidulated with hydrochloric acid, add this gradually to the former liquor until it ceases to throw down any precipitate; filter the liquor, and wash the precipitate well with boiling water, until the washings cease to form a precipitate with the nitrate of silver; afterward dry the precipitate at the temperature of boiling water. This product will be the purple powder of cassius, which appears to be a combination of deutoxide of tin and metallic gold.

ACTION OF THE SALTS OF GOLD ON THE ANIMAL SYSTEM.

According to M. Orfila, three quarters of a grain of muriate of gold, dissolved in a *gros* of distilled water, introduced into the jugular vein of a large and very strong dog, produced difficult and sonorous breathing, dispnœa, suffocation, and slight vomiting, which symptoms continued to increase, and terminated in the death of the animal. In another experiment, half a grain of the deuto-muriate of gold, dissolved in two *gros* and a half of distilled water, was injected into the jugular vein of a little dog; the symptoms came on very rapidly, and the animal died in four minutes. A strong dog was submitted to a third experiment: two grains of the salt were dissolved in a *gros* and a half of distilled water. This animal presented the

same symptoms as the others, and died in three minutes. On opening these animals, the effect of the salt was found to have been particularly directed to the organs of respiration and circulation ; the blood appeared to have been much affected ; the lungs were livid, gorged with blood, did not crepitate, were rugose, deprived of their usual colour, and scarcely floated on water ; the heart presented a violaceous colour ; the ventricle and the left cavities* were filled with black blood ; the right ventricle was contracted. The action of this salt upon the blood was so prompt, that a few moments after death the blood in the crural artery was of a red-brown colour, soon becoming black. The mucous membrane of the alimentary canal was not affected.

M. Orfila has also introduced chloruret of gold directly into the stomach of many animals, in order to study its direct effects upon this viscus. Through an opening made into the œsophagus, three grains of the chloruret were introduced into the stomach of a little dog ; the animal languished two days, and perished the third. Another dog was made to swallow a solution of ten grains of muriate of gold in an ounce of distilled water ; the animal vomited three times, discharged frothy saliva ; two days afterward he took food, the fourth day he refused aliment, and died in the night of the seventh. On opening the first animal, the mucous membrane of the stomach appeared inflamed, red, and ulcerated ; in the second animal, this membrane was also ulcerated, and in a state of suppuration. In these two instances the muriate of gold acted in a manner similar to corrosive substances.

According to M. Chrestien,† the muriate of gold is much more active than corrosive sublimate, but it is less irritating to the gums ; administered in the dose of a tenth of a grain per diem, it occasioned a high degree of febrile action The excitation produced by this salt, kept within proper bounds, is never accompanied by any apparent or sensible disturbance of the functions ; the breath is not tainted, the tongue is moist, appetite continues, the alvine

* Literal.—Tr.

† Méthode iatraleptique, 2d edit. p. 398 et 399.

dejections are natural ; and commonly an increase of urine and of perspiration are all the effects that can be observed. If the dose be carried too far, there will be danger of producing general erythism, and even inflammation of some organ, according to the predisposition of the individual. The fever produced by this salt approaches with an unusual and constant heat of the skin.

M. Cullerier's nephew has seen patients who have not been able to bear the muriate of gold in any manner. A lady, forty-five years of age, had ulcers in the nasal fossa, this remedy was administered to her in the dose of the fifteenth of a grain ; at the second dose gastric irritation came on, redness of the fauces, dryness of the tongue, pains in the bowels, and purging ; when these symptoms had disappeared, a twentieth of a grain was tried, the same effects followed. Several attempts were afterward made, but this lady was never able to bear the medicine ; she could not be cured by the use of mercury, to the action of which she was also very sensible.

According to the same surgeon, the general effects of hydrochlorate of gold and soda are an internal heat, headaches, dryness of the mouth and throat, oppression, gastric irritation, constipation or diarrhœa, and accelerated circulation. M. Magendie was consulted by a patient to whom muriate of gold had been improperly administered. A tenth of a grain had been taken for a dose, in a cup of milk, daily, for eight days, at the end of which time there was intense gastritis ; after the irritation was subdued, there was still extreme heat upon the skin, total absence of sleep, and fatiguing erections. This state of excitation, in spite of the mildest and most restricted regimen, continued to the end of three years. The patient afterward was not able to take wine, unless very much diluted with water.

CASES IN WHICH THE PREPARATIONS OF GOLD HAVE BEEN ADMINISTERED.

Before the time of M. Chrestien, the preparations of gold had been used in medicine ; they had even been

recommended in syphilitic diseases in the sixteennth century, by Gabriel Fallopius; but it is not for the cure of venereal diseases only that M. Chrestien advises the salts of gold: he asserts that he has employed them with success in most of the diseases of the lymphatic system, in scrofula, goitre, herpatic affections, schirrous, and even in tuberculous phthisis. Lalouette, in his Treatise on Scrofula, advises also very strongly the employment of the salts of gold. Many physicians who have repeated the experiments of M. Chrestien, have not been so successful as that gentleman; nevertheless, M. Duportal has related two cases of cure by these means; one of the patients had an ulcer on the face, which was considered to be cancerous, and which had resisted all the ordinary remedies; cicatrization took place after the employment of the salts of gold.

M. Cullerier, the uncle, does not consider the muriate of gold as a specific in syphilis, although he has cured some cases with this medicine. M. Cullerier, jun. has communicated the result of his experience of this medicine in the venereal hospital; he administered the hydrochlorate of gold and soda to a certain number of patients, of different ages, sexes, and constitutions; some presenting the symptoms of recent affection, such as ulcers, buboes, pustules, and excrescence; others had ulcers of the throat, palate, nasal fossa, organs of generation, exostoses, periostoses, cutaneous pustules, pains in the bones, &c. In the first cases of the first series, the effects of this medicine were as prompt as those of mercury; in the other patients the effects were less beneficial, in some even useless; in the latter cases it became requisite to use mercury.

In the consecutive diseases some good effects have been produced; the symptoms have been ameliorated in two or three cases; one has been completely cured; in others it has been administered in vain.

MEDICINAL EMPLOYMENT.

M. Chrestien has united the preparations of gold with soluble extracts of plants and sugar, in the form of lozenges;

likewise with syrups, and also with ointment for frictions to be used to the soles of the feet, after the method of Cirillo. MM. Duportal and Pelletier do not approve of these combinations, because animal and vegetable matter, whether dissolved or not, decompose the acid solution of gold, and reduce it to a metallic state. According to M. Proust there are few vegetable juices, acids, gums, sugars, &c. which may not have the property of deoxidizing gold. It is necessary, therefore, to avoid the employment of these preparations, which cannot be depended upon; the best method of using the salts of gold, is that of friction upon the gums; and the hydrochlorate of gold and soda is that which should be preferred. It has been employed at the Venereal Hospital at Paris, reduced to powder, and mixed with fifteen, twelve, ten, eight, six, and even four times its weight of vehicle; starch, or powder of lycopodium washed with alcohol, are the substances which appear best calculated to preserve the salt of gold; its decomposition takes place more or less readily with other powders, such as of liquorice, mallow, &c.

POWDER OF THE MURIATE OF GOLD AND SODA.

℞ Take of Muriate of gold and soda crystallized 1 grain.
Powder of lycopodium..... 2 grains.
Mix.

Begin by a fifteenth part of this quantity, and in a very gradual manner increase the dose to the strength of an eight of a grain of the muriate. It is to be applied once a day by friction, upon the tongue and gums. M. Chrestien observes, that it is seldom requisite to employ more than four doses in order to obtain the cure of the most severe syphilitic diseases.

PILLS OF THE OXIDE OF GOLD.

Take of Extract of the bark of the root of daphne mezereon 2 gros.
Oxide of gold by potass..... .....2 grains.

Mix carefully, and divide into sixty equal pills; instead of the six grains of the oxide of gold, one grain of the triple muriate may be used.

M. Chrestien prescribes these pills in scrofula and lymphatic obstructions: he commences with one pill per diem, and gradually augments the dose to seven or eight.

Dr. Niel, who has written upon the use of the preparations of gold, has advised a particular method for their employment, when the state of the tongue, or interior of the mouth, does not permit frictions to be made on these parts. He removes the cuticle on one side of the neck by means of a small blister, the part is then to be dressed, night and morning, with the following ointment:

Take of Axunge..... ½ gros.
Gold divided by mercury..... 1 grain.
Mix.

Increasing gradually the quantity of the divided gold to two grains. The following ointment may be substituted for the above:

Take of Axunge..... ½ gros.
Muriate of gold and silver..... 1-10 grain.
Mix.

SALTS OF PLATINA.

The processes for obtaining the salts of platina are exactly the same as those employed for the salts of gold; M. Cullerier, the uncle, has made use of the hydrochlorate of platina and soda, and the results are the same as those from the employment of the same salts with the gold base.

BARK OF THE ROOT OF THE PUNICA GRANATUM.

The decoction of the bark of pomegranate root, has lately been much extolled and employed for tape-worm, since M. Merat has published in France the treatise of M. Gomes* upon the employment of this medicine. In the publication of this celebrated Portuguese physician, we find sixteen cases in which the tape-worm has been expelled by means of this medicine—since which its efficacy has been confirmed by a great number of other observations.

* Journal Complémentine, tom. xvi. p. 24.

Among the French physicians who have recently recommended the use of the decoction of pomegranate bark for a tape-worm, M. Bourgeoise may be mentioned, a physician to one of the dispensaries of the Philanthropic Society of Paris, who has published many interesting facts upon this subject in the Bibliotheque Medicale (Dec. 1824). This practitioner, at the present time, calculates that he has succeeded in thirty-four cases, but he has not administered the decoction, except in those cases in which portions of tenia had been voided.

MEDICINAL EMPLOYMENT.

Vegetable broth (gruel anglicê) and spare diet are prescribed until the decoction be given. The evening before the medicine is taken, it is usual for the patient to take an *once* and a half or two *onces* of castor oil, with an equal quantity of syrup of lemons.

DECOCTION OF THE BARK OF POMEGRANATE ROOT.

Take of Fresh and dry bark of the root of the pomegranate (bruised)..... 2 onces.
Common water..... 2 livres.

Macerate without heat twenty-four hours, then boil gently until it be reduced to one *livre*, and strain.

This quantity of decoction is to be taken in three doses, one every half hour, or every three quarters of an hour.

☞ Usually in an hour, seldom so long as two hours after the third dose, the tenia is brought away entire, wound up into a ball, and strongly knotted in many places.

Sometimes the first and the second doses are rejected from the stomach; notwithstanding which the third dose must be taken. It has been stated that the medicine given in the manner described may produce serious consequences.

M. Bourgeoise, who gave it always in this manner, has never observed any thing which has induced him to give a less quantity; he has even used it in a stronger dose. If the tenia should not come away in an entire state, the vermifuge decoction should be repeated the following day.

FATTY PRINCIPLE OF THE BUDS OF THE ASPIDIUM FILIX MAS.

M. Peschier, apothecary at Geneva, brother to the physician of that name, has read to the Helvetic Society of Natural Sciences at Soleure, a paper upon the fatty principle of the buds of the male fern : he obtained this principle by digesting them in sulphuric ether.

Dr. Peschier* asserts that he has employed this tincture for tape-worm with constant success. This preparation has an oily consistence ; it is used, mixed with an extractive substance, in the form of pills, each of which contains one drop. Eight of these pills have sometimes been sufficient, but in some cases thirty have been required ; the exhibition of this quantity should occupy many days. Dr. Peschier asserts, that this medicine thus administered, does not fatigue the patients, and that it destroys the worm, which may be brought away by any mild purgative.

CHLORURETS OF LIME AND OF SODA.

M. Mazuyer, professor to the faculty of medicine at Strasburg, made known the advantages that may be derived from the use of the chlorurets of lime and of soda, in the year 1812. At that time he employed them with great success, in the wards of hospitals in which typhus fever was then raging, and for the purification of the theatres of anatomy. Facts as remarkable as useful, ought certainly, from this period, to have engaged the attention of men of science, nevertheless they were very little noticed, and remained almost unknown.

Nine years from this time the Society for the encouragement of national industry, offered as a subject for a prize, the means of removing the noxious odour from catgut manufactories. M. Labarraque completely answered the questions, and his essay gained the prize ; this skilful apothecary demonstrated by a great number of experiments,

* Bibliotheque Universelle, tom. xxx. p. 205.

that the chloruret of soda was one of the most powerful agents for the instaneous annihilation of that disgusting fetor, which is produced by the maceration of intestines in water.

The same gentleman extended the use of the chlorurets to the purification of all animal substances under putrefaction; and many distinguished physicians have used them as medicinal agents.

The Academy of Sciences decreed to M. Labarraque a prize of 3000 francs for having rendered a useful art less injurious to health; but the Academy having ascertained that ten years previously, M. Mazuyer had also employed the chloruret of lime to disinfect hospital wards, granted to him a sum of 2000 francs.

MODE OF PREPARING THE CHLORURETS OF SODA AND OF LIME.

Although the method of preparing these chlorurets has been known for a long time, it will nevertheless be useful to describe the manner in which M. Labarraque prepares them, in order to obtain always the same compound.

CHLORURET OF SODA.

Dissolve five *livres* of pure carbonate of soda* in twenty *livres* of distilled water, so that the liquor may be twelve degrees strong by the péseselt of Baume, put the liquor into a flask of a sufficient size, that it be not full by about a quarter. Place upon a sand-bath a glass balloon sufficiently large to contain four *pintes*, having a long neck with a wide mouth, introduce into it 576 *grammes* of hydrochlorate of soda, and 448 of the peroxide of manganese; lute to the mouth of the globe a large curved tube, and a tube with a double curve, thus S: for the introduction of the weak acid, place the first tube into a flask containing a small quantity of water, for the purpose of washing the gas, and from this flask should proceed a large

* Sodæ subcarbonas, P. L. † Aerometer.

curved tube, communicating with the vessel containing the saline solution.

The apparatus being properly disposed, and the luting very dry, pour into the tube, bent thus, S, the diluted acid, cold, and having been mixed for some hours with water, which prepare in the following manner : concentrated sulphuric acid 576 *grammes*, water 448 *grammes ;*—apply fire to the sand-bath, and continue the heat until chlorine ceases to be disengaged. The operation being finished, examine the strength of the product. For which take a portion of the chloruret and introduce into the berthollimêtre,* and pour upon it some of the solution of the sulphate of indigo, prepared in the following manner. Bengal indigo, powdered, one part, concentrated sulphuric acid six parts, unite them by means of heat, afterward dilute in 993 parts of distilled water. The chloruret ought to bleach eighteen parts of the sulphate of indigo, and if the liquor be not sufficiently impregnated with chlorine, it must receive a current of this gas, until it produce the effect above stated.

MODE OF EMPLOYING THE CHLORURET OF SODA.

It is the chloruret of soda which is principally employed on man. It has completely succeeded in all cases in which it has been used for the removal of general or local infection ; thus in carbuncle, in hospital gangrene, bad venereal ulcers, sloughing, wounds, or those of the phagedenic kind, rapid advancement has been observed towards cicatrization by the employment of the chloruret diluted in 10 or 15 parts of water. In numerous patients affected with ulcerated cancer of the breast, or of the uterus, which were in the hospice de la Salpétrière, it has been used daily as a lotion at the time of dressing ; by this means the fetor of the discharge has been destroyed, and the sufferings of these unfortunate women have been much ameliorated, and they have found from the use of these lotions, their sleep has been more tranquil. M. Alibert has prescribed simi-

* A graduated tube will answer the purpose.

lar lotions with advantage for herpes exedens. MM. Roche and J. Cloquet have found it equally useful in many of the worst cases of gangrenous ulcer. M. J. Cloquet directs the diseased limb to be bathed in a solution of one part of the chloruret with from 10 to 15 of water, and administers 25 or 30 drops of it in a *pinte* of barley-water.

M. Roche has effected, by means of lotions of the solution of the chloruret, the cure of porrigo favosa; this physician has used it with great success as a gargle in sore throat (l'angine couenneuse.) M. Sanson has used it in ulcerations of the mouth, and of the palate with caries of the bones, and has suspended by this means the ravages of the malady for some time.

M. Lagneau has made use of the chloruret as a lotion in cases in which the gums have been ulcerated, exhaling an offensive odour.

M. Lisfranc has used it extensively in burns and common ulcerations; for this purpose a solution of the chloruret, marking three degrees of the chlorometer of Gay Lussac.

Lastly, M. Boulay, jun. veterinary surgeon, has employed the chloruret with success in those carbuncle-like affections which are so frequently met with in horses.

CHLORURET OF LIME.

Take quick-lime, which slake completely by means of a small quantity of water, the moist powder formed by the lime mix with a twentieth part of its weight of hydrochlorate of soda, which put into long earthen vessels into which the chlorine can be introduced. The gas is disengaged from a mixture similar to that employed for the preparation of chloruret of soda. Many sets of apparatus may be placed by the side of each other as it may be required, nevertheless, taking care that the chlorine passes slowly into each of them, in order that the combination may be made successively; this circumstance is essential to the success of the operation. The hydrated lime being sufficiently charged with chlorine, becomes moist, and by

this phenomenon it is ascertained that the operation is about to terminate. In order to try its point of saturation, take one part of the chloruret, which dilute in 130 parts of water, this solution ought to bleach four and a half parts of sulphate of indigo. The addition of the hydrochlorate of soda to the lime is for the purpose of facilitating the absorption of the chlorine.

In large establishments, such as hospitals, barracks, prisons, &c., where the daily and extensive use of these disinfecting agents is necessary, the chloruret of lime may be prepared in a more economical manner, according to the following process :—Take 40 *litres* of water, one *livre* of common salt, five *livres* of fresh-slaked lime : place into this liquid (which must be kept stirring with a piece of wood) a tube which extends some inches into the vessel, and which conducts to it the chlorine disengaged from a mixture, less by half than that which has been described in the process for obtaining the chloruret of soda. This chloruret will still have more strength than is sufficient for the disinfection of wards or the purifying of animal substances, it may therefore be mixed with a sufficient quantity of water, and used as will be pointed out immediately.

MODE OF EMPLOYING THE CHLORURET OF LIME.

Previous to examining an animal body, while in a putrefying state, it will be necessary to procure a bucket, in which put 24 *litres* of water, to which add a *demi-kilogramme* of chloruret of lime, and mix them well together.

Let a sheet be completely moistened with this solution, and wrapped about the whole subject, so that every part of it may be covered.

The putrid odour will soon cease. If blood or any other fluid should escape from the body, pour upon it a few ounces of the chloruretted water, and the fetor will be destroyed.

If there be an unpleasant smell in passages, staircases, &c., let them be sprinkled with the liquid.

Care should be taken to sprinkle the cloth which covers

the body frequently with this liquid, by which means the offensive odour will be prevented.

A few years ago a striking example was seen of the energetic property of the chloruret of lime as a disinfectant.

On the first of August 1823, at the request of the King's attorney, a corpse which had been interred two months was exhumed; it remained exposed, and out of the coffin nearly three hours, the temperature of the atmosphere being from 17° to 18° of the centigrade. This body spread an insupportable odour, it swelled in a very apparent manner while out of the ground. A few aspersions with the chloruret of lime dissolved in water instantly removed the offensive smell, so that it was possible to commence an anatomical inspection.

The chloruret of lime may be used with advantage for the disinfection of privies, water-closets, ships, stables, hospital wards, &c., for which purpose it will be sufficient to dilute the chloruret in 60 times its weight of water, and to sprinkle the clear solution over the surfaces of the objects or places which are intended to be purified; a broom or a watering-pot may be used for this purpose; a few minutes will be sufficient to complete the disinfection.

In wards with patients, the solution is to be poured into deep plates and placed under the beds: the infectious odour cannot spread, because it is destroyed in proportion to its formation, in consequence of the continual disengagement of chlorine.

PHOSPHORUS.

M. Solilat has been for a long time engaged in the study of the medicinal properties of phosphorus and its preparations. In the second volume of Littérature Médicale étrangère, which was published in 1799, and in the Journal général de Médecine, so great a number of documents appear respecting this heroic medicine, that they would be sufficient to form its history, of which the following is the summary. This gentleman received his first ideas on this subject from a dissertation in the seventh volume of Hal-

ler's Collection of Theses, entitled De Phosphori loco Medicamenti, aliquot casibus singularibus confirmatâ, auctore J. Gabr. Mentz, Witteberg, 1751. Very little is found respecting phosphorus in works written previously to this epoch. The first case recorded is that by Dr. Mentz in 1748. After a malignant petechial fever an obstinate diarrhœa supervened, attended by great anxiety about the præcordia, delirium, and general prostration of strength; two grains of phosphorus made into a bolus with theriaca, were administered; quietude was immediately produced, with sleep and gentle perspiration. At night and the next morning the phosphorus was repeated in doses of three grains, the perspiration became profuse, having a sulphurous odour. All the functions were speedily re-established, and the disease ceased. In the second case there was extreme weakness, the result of a bilious fever, two doses of three grains each were given in the day, mixed with conserve of roses, the patient passed a comfortable night, a plentiful diaphoresis was produced, and health was rapidly established. In a third case of delirium and general weakness, after malignant catarrhal fever, six grains of phosphorus, given in two doses, produced an effect similar to that in the second case. This powerful remedy has been extolled by Morgenstern (Shulzii Prælect. in dispensat. Brandenb. 1753), and by Hatman (Dissert. sistens spicileg. ad phosphor. urin. usum internum pertinens).

Wolff, in an inaugural dissertation at Gottingen, in 1791, reports twelve cases extracted from the case-book of his father,* in which phosphorus was employed; the results were so extraordinary that the author was induced to call phosphorus a divine remedy; he gave it in the dose of two or three grains dissolved in ether. The London Medical Review, for March 1799, contains a Report made by a Society of Physicians in London, upon the medicinal properties of phosphorus, from which it would appear, that this substance holds the first rank among the alixiteria and alexipharmica, and that it had been employed with suc-

* The father of this physician was an eminent medical practitioner in Poland.—Tr.

cess where the vital powers were nearly extinct, but that this powerful and active remedy should be employed with the greatest caution.

It appears in the Bibliothèque Britannique, that Conradi, a physician at Northeim, considers phosphorus as a remedy calculated to rouse the vital powers ; he employs it in malignant fevers, after the first stages, when there is that exhaustion of strength which induces the ordinary symptoms of approaching death. Of seven cases in which he had recourse to this medicine, four were attended by happy results ; in the three other cases considerable relief was obtained by the administration of the remedy, although they did not recover. Mandel speaks of the efficacy of phosphorus in cases of atonic epilepsy, but his observations do not appear to be conclusive.

M. Hufeland has observed the good effects of phosphorus in an obstinate case of gout with concretions, in which this medicine produced very profuse perspirations ; he used it also in a case of poisoning by lead and arsenic, and gave it to a man whose life was threatened by marasmus.

In the midst of all this success, Weickard, in the second part of his various writings, related cases and experiments which ought to put practitioners upon their guard against the rash employment of this remedy. He cites three examples of death following its use, in which doses of from three to six grains had been taken internally, or the same substance had been employed in frictions combined with unctuous matter. On opening the bodies, gangrenous patches were discovered in the stomach.

The same appearances were observed in a dog to which phosphorus had been given.

Alphonse Leroy, in the first volume of the Transactions of the Medical Society of Emulation, relates an experiment that he made upon himself, and of which he was very near becoming the victim. Having seen that the German physicians gave phosphorus in the doses of six, eight, and even twelve grains per diem, mixed with confections, he took three grains of it made into a bolus with theriaca. He soon repented of his imprudence, recollecting that phosphorus heated, has not occasion of more air than what is con-

tained in the stomach, to produce a combustion which might pierce that organ. During two hours he was very uneasy; he drank frequently small quantities of cold water and became relieved. His urine became very red. The next day his muscular power was doubled, and he felt an intolerable venereal irritation. A similar phenomenon was observed in the laboratory of M. Bertrand Pelletier, a drake and several ducks having drunk from a basin, which contained a solution of phosphorus and copper, died, but the male had his sexual appetite so excited, that he died the first, apparently in consequence of the exhaustion occasioned by the reiterated acts of copulation. Alphonse Leroy has obtained great success from this medicine, which he considers to be one of the most powerful that the Materia Medica affords. Le Cointre his pupil, a physician at Rambouillet, has used it with equal success.

Other French physicians, and particularly the members of the Commission of the gratuitous consultations of the Society of Medicine of Paris, made frequent use of this remedy, and from it obtained very remarkable results.

In 1802, the father of MM. Gaultier de Claubry, a skilful physician, published in the Journal General de Medecine, tome xvi. four cases of great interest on the good effects of phosphorized ether in paralysis and atony with infiltration.

M. Gumprecht has inserted in the London Medical Repository, March 1815, two observations on the efficacy of phosphorus in the treatment of paralysis.

In the same year, 1815, a work appeared by Daniel Lobstein, the object of which was to determine the diseases for which phosphorus might be employed, to ascertain the doses of this medicine, and the best mode of administration. After different chemical observations upon this substance, the author brings forward a series of cases, some taken from authors of the first respectability, others which have occurred in the course of his own practice. Notwithstanding the solid information of M. Lobstein, he may perhaps be accused of having a little love for the marvellous; for in his hands this remedy seems to have produced absolute resurrections. The diseases in which it has been

given with great success, according to this author, are ataxic and adynamic fevers, with extreme prostration of strength, obstinate intermittent fevers, rheumatic and gouty affections, amenorrhœa, chlorosis, &c.

ON THE EMPLOYMENT OF PHOSPHORIC ACID.

Phosphoric acid has also been the subject of many observations and experiments, which have fixed the opinion of physicians upon its utility. Doctor Lentin has given to the Royal Society of Gottingen, a paper De acid Phosphori carici ossium domitore. The author observes, that the phosphoric acid constitutes the essential part of the bones ; that they preserve a solid form for a considerable length of time, and when by any chemical means they are dissolved, the residue resulting from this decomposition is found saturated with the acid in question. He therefore considered that it would be possible to employ this acid usefully in caries of the bones. For this prupose he applied compresses moistened with phosphoric acid, diluted with eight parts of distilled water, upon ulcers under which carious bone existed. He renewed the dressing twice daily, and when the ulcers became more fetid, he used it by injection, covering the part with a pledget charged with myrrh and mastic. In many cases of this nature, Dr. Lentin has obtained great advantage from this application. The ulcers lose their fetor, the ichorous sanies which flows from them gradually changes its character to that of healthy pus. The carious portions of the bones exfoliate with facility.

The same physician has made use of the phosphoric acid internally, with great success, in phthisis pulmonalis, in the dose of from two to thirty drops, every three hours, in a glass of sugared distilled water, but this disease must be free from all inflammatory symptoms to admit of the remedly. Sugared milk was given after every dose.

Dr. Hacke, a physician at Stralsund, has employed this medicine for ulcer of the womb ; the quantity of the discharge, and its offensive odour, speedily diminished.

Bertrand Pelletier relates the case of a man. who pur-

sued the pleasure of love to very great excess, and who had all the symptoms of tabes dorsalis, and had reached the last degree of exhaustion ; he was put under the use of a drink prepared with phosphoric acid and honey, and in a very short time he regained his strength, and followed his old course.

Alphonse Leroy has known persons, who, from time to time, have made use of a drink composed of phosphoric acid, sugar, and orange-flower water. They believe that in this remedy they had the means of preserving their health, their strength, and even of producing long life. He gave this drink in putrid malignant fevers, and he preferred it to that made with sulphuric acid.

M. Le Lillot has seen very bad cases of scrofula with caries, cured with astonishing rapidity by the employment of phosphoric acid. He has constantly seen great benefit derived from frictions made night and morning with phosphorized ointment, in atonic paralysis, in weakness of the external senses, and in some cases of chronic rheumatism in weakly persons. But even here great care must be taken not to carry it too far ; for a sudden, general, and painful erythism will sometimes come on, frequently obstinate, and in some cases incurable.

MODE OF PREPARING PHOSPHORIZED MEDICINES AND METHOD OF EMPLOYING THEM.

No preparation of phosphorus, in a solid form, is worthy of confidence : for there will be either an entire combustion, and in that case no effect, or an imperfect combustion, and then there will be uncertainty in the dose ; or combustion may not take place, and then the remedy becomes dangerous. It is perhaps to this class that we may refer all the English and German preparations, in which phosphorus is suspended in linctuses, emulsions, or conserves, the luminous pills of Kunchel, the phosporized powder of Alphonse Leroy, &c.

Bertrand Pelletier, who has made very extensive and useful researches respecting phosphorus, has pointed out a very excellent method of preparing this substance for

medicinal purposes. He was struck with what Conradi stated respecting the dissolving of three and even four grains of phosphorus in a *gros* of ether, as a very easy thing ; while M. Hufeland had asserted, on the contrary, that an *once* of ether would not dissolve more than eight grains, and that neither of these gentlemen had described the manner in which their respective solutions, were made. After many attempts, he obtained the same results as M. Hufeland ; that is to say, he was able to dissolve eight grains of phosphorus by an *once* of ether, and could have carried the solution farther. But in order to possess a medicine, the doses of which might easily be regulated, he chose six grains as the quantity of phosphorus to be dissolved in each *once* of ether.

This process consists in putting six grains of phosphorus, cut into small pieces, into an *once* of sulphuric ether, rectified to 65 degrees of the (aréo metre de cartier) ; this mixture must be occasionally agitated for three or four days.

The dose of this medicine is from 10 to 15 drops, in a glassful of barley-water, or any convenient vehicle ; and repeated so, that from 120 to 150 drops may be taken in the space of three or four days. This is commonly sufficient to produce a cure.

This liquid may be used in frictions also, when such are deemed necessary.

To M. Pelletier's preparation M. Lolstein adds the essential oil of cloves ; but this preparation with or without the addition, is not the best of all, says M. Sedillot, (Journal General de Medicine, tom 55, p. 100), because the phosphorus remains in it in a luminous state.

The same may be said of a solution of phosphorus in an essential oil.

M. J. Pelletier, on this point expresses himself as follows (Journ. Gen. de Med. tom. 59, p. 237) : " There are phosphorized preparations, the employment of which may be attended with danger ; such are all those in which the phosphorus is not completely dissolved ; the same may be said respecting those preparations in which the phosphorus is dissolved in a volatile fluid only, such as ether and es-

sential oils, because under these circumstances exposure to the air and the heat of the body driving off the menstruum, the phosphorus remaining per se, may inflame by heat and friction. But with fat, or fixed oils, this inconvenience does not take place, because these substances not being volatile, cannot leave the phosphorus at liberty, and in case of absorption no separation of the phosphorus takes place. I am unacquainted with the method that M. Lescot makes use of for the division or solution of phosphorus ; I only know, as Morelot says, that he employs a compound of hydrogen, oxygen, and carbon, not to say a vegetable or an animal substance, deprived of azote. The excellence of the process I cannot doubt, after the testimony of several physicians, and from the known talents of the author, it is very desirable that the plan should be made public."

These processes have now been made known to the public by M. Sedillot in the following words : " M. Lescot, apothecary of this capital, prepares phosphorus by combining it with fatty substances, and rendering it aromatic by the addition of an essential oil ; he prepares it in the form of a liquid, and also as an ointment. Phosphorus divided in this manner is not luminous, nor does it ever precipitate.

M. Sedillot, the witness of M. Lescot's experiments, has communicated the process admitted by that apothecary. A process which had already been divulged to many persons, among others to his son, physician at Dijon, and to M. Caventou, and of which the following is the formula :

Take of Phosphorus..... 1 once.
Oil of Olives or of sweet Almonds.... 1 livre.

Cut the phosphorus into very small pieces, introduce them into a flask with a ground stopper, and add the oil ; leave them in contact at the ordinary temperatute in a dark place for fifteen days, then decant and render it aromatic with the essential oil of bergamot ; let it be kept for use in a well-stopped bottle, and not exposed to the light. This oil may be administered internally by 25 or 30 drops in the twenty-four hours, in emulsions or mucilaginous drinks, and may be continued four or five days.

For external use an ointment is made by mixing it with a suitable portion of axunge. In this state it is employed in frictions for four, six, eight, or ten successive days; it is not unusual for this ointment to become luminous during the frictions, if care has not been taken to keep it in the dark.

LOZENGES OF THE BI-CARBONATE OF SODA, OR DIGESTIVE LOZENGES.

It is not doubted that the gastric juices poured into the stomach during digestion are of an acid nature. The experiments of MM. Prout, Children, Prevost et Leroyer, Tiedeman et Gmelin, tend even to prove that this acidity is owing to the presence of hydro-chloric acid; these are the acid juices which commence the solution of the food. Moreover, MM. Prevost et Leroyer, Tiedeman et Gmelin, Leuret et Lassaigne, have observed that the presence of soda contained in the other fluids, which assist in digestion, saturates the free acid, and that this saturation is essential to the complete solution of the aliment. M. d'Arcet* has demonstrated by direct experience, making trials on his own person, that the bi-carbonate of soda, taken in small doses, facilitates digestion. And in a second very interesting dissertation, the same gentleman has shown what is the influence of the water of Vichy† upon the urine and other secretions: this mineral water owes its most active properties to the presence of the carbonate of soda, of which it contains a much larger quantity than of other salts, and it is well known that the employment of this water is especially useful in dyspeptic cases, calculous affections, &c. Soda-water may be employed with equal advantage in the same circumstances; thus it appears that theory and practice unite to establish the medicinal character of the bi-carbonate of soda. It has been said that Mascagni had

* Sur la Preparation et l'Usage des pastilles digestives contenant du bi-carbonate de soude. (Annales de Chimie et de Physique, 1826.)

† Vichy, a town in the department of Alier, celebrated for its mineral waters which are alkaline and acidulous.—Tr.

already recommended the bi-carbonate of potass in calculous diseases.

MODE OF PREPARING THE DIGESTIVE LOZENGES.

Let bi-carbonate of soda and refined sugar, each reduced separately to a fine powder, be put into a very dry bottle—shake the bottle well that the powder may be thoroughly mixed. Take any quantity of this powder, let it be well mixed on a marble slab, with a sufficient quantity of mucilage of gum tragacanth, and oil of mint; form the mass into lozenges, each weighing about one *gramme*, dry them in the air or on a stove.

FORMULA OF M. D'ARCET.

Take of	Dry pure bi-carbonate of soda in fine powder	5 grammes.
	Fine white sugar in powder	95
	Mucilage of gum tragacanth prepared with water	q. s
	Essential oil of mint,* pure and fresh	2 or 3 drops.

As these lozenges attract slightly the moisture of the atmosphere, they ought to be kept in well-stopped bottles, or in a dry place: they may be flavoured with any other essential oil, or with the balsam of tolu, which is very suitable for that purpose.

MEDICINAL EMPLOYMENT.

Each lozenge, weighing one *gramme*, contains nearly 0 gram. 0.5 of bi-carbonate. Experience has proved to M. d'Arcet that two or three lozenges are sufficient to remove indigestion, and that in this affection they are much more efficacious than the natural water of Vichy. This gentleman considers the prompt and complete action of this substance to be purely chemical, saturating the excess of acid which has been developed in the prima via. Much benefit has been obtained from the use of these lozenges, when taken immediately the functions of the stomach are

* Ginger is preferred in London in the composition of soda lozenges. Tr.

found to be in a deranged state: if taken before a meal, the digestive functions will be performed with more facility. These lozenges, being very useful to assist digestion, ought to be prescribed before and after a meal to patients afflicted with gout or calculi. But in cases of gravel, and even of gout with concretions, the alkaline gaseous waters ought to be taken conjointly with the lozenges. Or instead of these waters, from half a *gros* to two *gros* of the bi-carbonate of soda may be taken in any proper fluid. With this treatment a vegetable diet should be prescribed, avoiding all substances containing azote. (See Recherches sur la Gravelle, par M. Magendie, Paris, 1813.

DIGITALINE.

M. Auguste Leroyer, apothecary at Genoa, has read to the Society of Physics and Natural History of this city, an essay on the active principle of the Digitalis Purpurea, which he had obtained in a separate state, and with which he had made several experiments upon animals. To obtain a substance from digitalis, which shall always be identical, and possess the same medicinal properties, is a matter of considerable importance.

MODE OF PREPARATION.

In order to extract digitaline, M. Leroyer takes one *livre* of digitalis purpurea of commerce: he treats it first by cold ether, afterward by the same fluid warm in an autoclave, in order to be able to raise its temperature. The tinctures obtained in this manner exhibit, after filtration, a greenish-yellow colour, and have a bitter flavour; the residue from their evaporation has a resinous appearance, and is intolerably bitter, and produces upon the tongue that benumbed sensation, which is experienced from chewing the aconites. Exposed to the air, this residuum absorbs moisture rapidly--when mixed with distilled water it divides itself into two parts, the vehicle holds one of them in solution, the other precipitates and presents all the characters of clorophylle. The aqueous solution of the ethereal

residue reddens turnsol paper. M. Leroyer has added to it the hydrate of the protoxide of lead, in order to neutralize the free acid indicated by the reagent, and to separate the bitter principle which apparently was combined with it. The salt of lead thus produced was soluble, and consequently could not be separated from the bitter principle. Certain earths were tried also, but did not form a precipitate, it was therefore necessary to have recourse to another method. After having evaporated to dryness the portion treated with the lead, it is again dissolved in highly rectified ether; by this operation the principle of digitalis is obtained, disengaged from those substances with which it was united. By evaporation this solution yields a brown heavy substance, slowly restoring the blue colour to turnsol paper, reddened by an acid. If, as M. Leroyer observes, it approaches alkalies by the last-mentioned character, as well as by its bitterness, its extreme deliquescence separates it from them. This property prevents it crystallizing in a distinct and permanent manner, nevertheless this gentleman believes that it will crystallize regularly under favourable circumstances. Dr. Prevost, having placed a drop of the solution of digitaline in alcohol upon a piece of glass, and having evaporated it carefully over the flame of a spirit lamp, there appeared under the microscope numerous and well-defined crystals of various forms. The same observer asserts that the form which appeared to be the base of all others was the prism with rhomboidal bases.

ACTION OF DIGITALINE ON THE ANIMAL SYSTEM.

M. Leroyer has made the following experiments: he dissolved a grain of digitaline in three *gros* of distilled water, which he injected into the abdomen of a middle-sized rabbit; after some minutes the respiration became slower, the pulse, which was rapid, fell to 60, and became very irregular; all the vital phenomena became gradually extinct: it died without agitation and without distress, like falling to sleep. This fact, adds M. Leroyer, is the more remarkable, in consequence of the extreme facility with which a rabbit becomes convulsed.

Half a grain of digitaline, dissolved in two *gros* of tepid water, was injected into the veins of a cat; the animal died at the end of fifteen minutes; the symptoms were the same as those observed in the rabbit in its last minutes, the respiration sank to six or eight, the pulse before finally ceasing, became feeble and irregular.

A grain and a half of digitaline was dissolved in half an *once* of water, and was injected into the jugular vein of a middle-sized dog; he died in fifteen minutes. The arterial blood of the animals which have been killed by this substance present a very strong venous colour, has very little tendency to coagulate, the red globules appear, when examined by the microscope, especially in the cat, a little altered in form, but not decomposed. Other observations have been made upon small animals, from the instant in which they have been put under the influence of the poison, until that of their death, the nearer the blood was drawn to the approach of death, the more it was disposed to remain fluid; the globules in these cases presented no trace of alteration in form. It appears that the deleterious principle in solution in the blood acts directly upon the nervous system.

Nevertheless, an attentive examination of the brain and its dependencies have not enabled MM. Leroyer and Prevost to ascertain on what parts the digitaline acts. The sinuses of the brain were gorged with blood, but the cerebral substance did not appear to have undergone any alteration.

APPENDIX

TO THE

FORMULARY,

CONTAINING AN

ACCOUNT OF THE EXPERIENCE OF BRITISH PRACTITIONERS WITH SOME OF THE NEW REMEDIES DESCRIBED IN THE FOREGOING WORK.

Modus utendi e veneno facit medicamentum,
E medicamento venenum.

By JOSEPH HOULTON, F.L.S.,

MEMBER OF THE ROYAL COLLEGE OF SURGEONS, LONDON; AND ASSOCIATE OF THE MEDICO-BOTANICAL SOCIETY.

APPENDIX.

NUX VOMICA.

From the time of that bold experimentalist and indefatigable botanist, Gesner, nux vomica has been recommended by various authors, in fevers, maniacal, hypochondriacal, and hysterical affections; also in gout, rheumatism, hydrophobia and the plague; it has been also extolled as a successful remedy in dysentery.

The late Dr. Good observed, that this article has the peculiar property of diminishing the sensibility, while it increases the irritability, of the animal frame. He was never able to give more than seven grains, without its producing a stupid state of the head with vertiginous symptoms. He gave it in one instance to the extent of eight grains every six hours, beyond which he considerered it to be imprudent to proceed.*

Dr. Elliotson, Physician to St. Thomas's Hospital, in his work on hydrocyanic acid, &c., mentions two cases of hemiplegia for which he prescribed the extract of nux vomica; the results are not mentioned, but the doctor, in a note under these cases, makes the following remarks:— "The nux vomica has been lately very much recommended in France for cases of paralysis. A general remedy for this complaint is an absurdity, because, like most others of the nervous sysem, the disease may proceed from a great variety of causes. In the greater number of very recent cases, and in those of long standing which are accompanied by evident fulness of the head, its use is hazardous,

* Vide Study of Medicine, by Dr. J. M. Good, pasism.

I knew a short plethoric old man, who had been hemiplegic for a twelvemonth, become rather intoxicated by a moderate dose of it, and by repeating it two or three times bring on a second stroke of his disease. Many have complained so much of headache and stupor from its exhibition, while no good effect was produced, that I have been obliged to suspend its use. It causes heat and heaviness of the head giddiness, &c., in fact all the effects of very strong beer; its inadmissibility in many cases of paralysis is, therefore, apparent. When nothing has forbidden its exhibition, I have frequently used it without benefit. One hemiplegic old woman, whose disease was of six months standing, took it in vain above half a year. Still, however, I have sometimes found it serviceable. A few patients have recovered rapidly on commencing its employment, after long resorting fruitlessly to other means. The power which it possesses of stimulating the nerves of voluntary motion was very remarkable in an old woman who had lost the use of the left arm and leg for sixteen years. A course of it did her, as might be expected, no good, and not only occasioned a little tingling of the afflicted arm, but very often caused the fore-arm to be suddenly drawn up for a moment, although the extremity had never previously moved once the whole sixteen years.

"The extract which I have employed is extremely good, and manufactured by Mr. Battley. The dose has been at first half a grain, and has been afterward cautiously increased a quarter of a grain every day or two. No one has borne more than seven grains for a dose, few more than four."

Dr. Scudamore, in his Observations on the Stethoscope, &c., states, "he has used the alcoholic extract of nux vomica, and has had great cause to be gratified with its useful agency in relieving the symptoms of neuralgia. He also mentions that a friend of his has used it with success in tic doloreux."

Nux vomica has been long known as an active poison, for which purpose it is used in this country for the destruction of mice and small birds. Loureiro relates that a horse

died in four hours after taking a drachm of it in a half-roasted state.

A dog has been killed by a scruple, a rabbit by five grains, and a cat by four grains.

Hoffman states, that a girl ten years of age was killed by taking fifteen grains at two doses.

It does not appear that either strychnine or brucine have been yet introduced into British practice.

The writer has seen some beautiful specimens of the preparation from this substance at Mr. Morson's, Southampton-row, a very skilful operative chemist, who has in his possession a fine collection of the new French remedies.

MORPHIA.

A preparation which owes its medicinal properties to this substance, has been long known under the name of the black drop, for which the following is the formula, as given by Dr. Armstrong, who became possessed of the original papers of the late proprietor of this nostrum.

Take half a pound of opium sliced, three pints of good verjuice, one and a half ounce of nutmegs, and half an ounce of saffron. Boil them to a proper thickness, then add a quarter of a pound of sugar, and two spoonfuls of yeast. Set the whole in a warm place, near the fire, for six or eight weeks, then place it in the open air, until it becomes a syrup ; lastly decant, filter, and bottle it up, adding a little sugar to each bottle. One drop of this preparation is considered equal to about three of the Tinctura Opii P. L.

A nostrum has been vended for a few years by Mr. Battley, druggist, in London, which he has named liquor opii sedativus, and which is generally supposed to owe its efficacy to the acetate of morphia. It is liable to undergo important changes on being kept, which is an objection to its admission into practice.

The acetate of morphia is gradually obtaining favour with British practitioners, and promises soon to become the favourite anodyne preparation. The observations which

the writer has made on its action have been very satisfactory.

SULPHAS QUINIÆ

Is the only preparation from the alkalies of the cinchonas in general use in this country ; it is not surprising that a remedy so powerful, so extensively applicable, and so peculiarly suited to the diseases of our climate, should be received by British practitioners with unqualified approbation. Its powers and value are so well known to every member of the profession, that extensive detail is superfluous.

Dr. Elliotson, whom M. Magendie has quoted, states in the 13th vol. Med. Chir. Trans. that he has used the sulphas quiniæ very extensively in agues. "Many of the cases were combined with so much inflammation in the abdomen, chest, or head, as to require venesection, some with dropsy, some with chronic disease of the liver or lungs—but every one was cured, having never seen it augment any inflammation that might be present, or interfere with antiphlogistic measures. He has always given it under all circumstances, and simultaneously adopted other measures that might be demanded by other symptoms. Some cases, and those were generally quartans, would not yield to less than five grains every four hours, but this quantity has never failed, after being exhibited a week or ten days. The disease in London may in general be arrested immediately by the exhibition of ten grains at once, just before or after the paroxysm. He is convinced that the best practice is first to give ten grains as soon as the paroxysm is over—this almost always prevents the paroxysm next expected, and if repeated daily at the same hour, often cures the disease ; but as ten grains given in any number of doses in twenty-four hours are frequently insufficient to conquer it. and half a drachm may be required, it is sometimes necessary, in addition to these ten grains, after the fit, to make the whole quantity in twenty-four hours amount to a scruple or half a drachm, by small doses, also every six or eight hours."

Dr. Elliotson has also used simple quinia as a general tonic. The following is the mode of preparation in his own words:

"The article was prepared for my use by digesting cinchona in a very dilute solution of sulphuric acid, two ounces to four gallons of water, straining, and then adding magnesia to saturation, by which means the quinia was precipitated from the acid mixed with tannin and extractive matter, and sulphate of magnesia remained in solution; the precipitate was again dissolved in sulphuric acid, again precipitated, and finally washed and dried.

"A pound of cinchona cordifolia furnishes about an ounce of this impure quinia, or about two drachms of pure sulphate of quinia, which is obtained by another process, described in the foregoing pages."

In using the quinia or its sulphate for the cure of intermittent fever, Dr. Elliotson advises the continuance of the medicine for about a week after the paroxysms have ceased.

These preparations may be used in all cases in which cinchona is applicable, and they will be found to be more prompt in their action, and at the same time more easy on the stomach than bark in substance. The writer has given it with the most decided benefit to patients who could never bear any other form of cinchona. He has witnessed very great inconvenience from the use of cinchona in substance, by its forming a solid mass in the colon, producing very great uneasiness, and passing away with considerable difficulty.

PRUSSIC ACID.

In Dr. Granville's Historical and Practical Treatise on Prussic acid, he observes, "that the cherry laurel, in which this acid abounds, was introduced into Europe from Tresbonde, in 1576, and although from that period many physicians in different parts of Europe have mentioned it in their writings, yet Dr. Granville asserts that he was the first to call the attention of the medical profession in England to the subject of the Prussic acid, as

a remedy in inflammatory and other diseases of the chest: he prefers the medicinal Prussic acid prepared from Vauquelin's acid, by Mr. Garden, Oxford-street. And he asserts it may be employed with benefit in confirmed tubercular consumption, in incipient pulmonary consumption, in all cases of asthma and chronic catarrhs—in spasmodic coughs, especially in hooping-cough; in sympathetic cough; in painful menstruation; in abortions, uterine hæmorrhage, hæmoptysis; in nervous diseases and derangements of the the stomach; in subacute inflammation, to prevent the necessity of blood-letting. In fevers and inflammatory diseases, he farther remarks, that there is every reason to believe that it may, as a powerful sedative, be employed where all other narcotics cannot."

Dr. Elliotson appears to have been very careful and discriminating in his observations upon this article as a medicinal agent, and while he entertains a very high opinion of it in some cases, he at the same time is decidedly of opinion that it does not cure inflammatory affections, as I have learned by the private communications which that gentleman has done me the honour to make to me, as well as from his published writings. In his valuable work on the use of Prussic acid, published in 1820, it appears that he has found it to be very successful in relieving pain about the pit of the stomach, even when connected with other symptoms, as pyrosis, excessive irritability producing vomiting, in disorders of the stomach, resembling affections of the heart; and that it has not given relief by any action it had on the bowels. He asserts, it is useless when given to subdue inflammation; nor does it lessen the excessive action of the heart. In affections of the stomach, in which leeches, blisters, &c. are needed, it may be given at the same time, or immediatety afterward, as its ordinary soothing effects upon the stomach will be no longer prevented by a morbid state of vessels.

He has found it to fail as a general anodyne, and that it only relieves pain directly when about the epigastrium. It appears to act specifically upon the stomach; and that an over dose produces nausea, vomiting, pain, and tightness in the precordia: this will sometimes occur where

it is used externally. In stomach cases he continues it two or three weeks after the cure appears to be affected. He has found that almost any adult will bear one or two minims, few more than five minims, three times a day; a child may begin with half a minim.

In simple dry cough, without pain in the chest, constant dyspnœa, or fever, whether in children or adults, he has found the Prussic acid highly beneficial. He has not found it of much use as an external application.

In the 13th volume of the Medico-Chirugical Transactions, 1825, the same gentleman observes, "Very extensive experience with Prussic acid for four years has fully confirmed all I published respecting it in 1820, and has not furnished me with any additional information, except that it is equally successful against violent and chronic hiccup, as against other symptoms of disordered stomach, and that it will in some cases cause ptyalism and irritation of the mouth, as noticed by Dr. M'Leod."

To the present time Dr. Elliotson informs the writer that he has been disappointed in this medicine in all inflammatory or organic diseases of the chest, and that he has never found it to relieve pain in the intestines. The acid Dr. Elliotson prescribes is that prepared by Garden, made after the process of Vauquelin.

In the Edinburgh Medical and Surgical Journal, October, 1827, there are two cases of the successful exhibition of this acid in chorea, by Mr. Stuart.

Dr. Ure, in his third edition of the Chemical Dictionary, gives the following simple and economical process for obtaining hydrocyanic acid of moderate strength, suitable to most chemical and all medicinal puposes, by dissolving ferroprussiate of potass in water, adding to the solution contained in a retort, as much sulphuric acid as there was salt employed, distilling with a gentle heat, hydrocyanic acid is obtained. If it be tinged blue by a little of the iron, this may be separated either by filtration or re-distillation.

Dr. Murray states that ammonia is a certain antidote to poisoning from Prussic acid. (Vide Edin. Journ. Med. Science, No. 4.)

IODINE.

This powerful agent has been used for the cure of disease in this country with great success, and in many of those distressing cases which had been considered, previous to its introduction, to be beyond the control of medicine.

In a private communication which Dr. Elliotson has very politely made to the writer, he states, "that few have perhaps used iodine more extensively than he has. He has cured many cases of bronchocele with it, some of large size, and has never yet failed; but he has not healed any that were very hard: and he has sometimes persevered with the remedy for a year and a half before the disease has yielded. He has also been very successful with it in chronic rheumatic swellings of the wrist and joints of the fingers. He has never seen more than temporary inconvenience from the remedy; but then he has always begun with a small dose, and very gradually increased the quantity, omitting it altogether for a time if nausea, vomiting, purging, pain, or nervousness occurred, and resuming it after the cessation at a smaller dose. He has commenced with five minims, three times a day, of the saturated tincture, and he has sometimes reached 90, 100, and even 110; but in general so much cannot be borne. The varieties of the quantity which occasions irritation in different persons is very great. He has generally, at the same time, applied it externally, ʒss being mixed with ʒj of lard: if this proves too irritating, he substitutes the hydriodate of potass, ʒss or ʒj to the ʒj of lard. When he has given the hydriodate internally, he has dissolved ʒj in ʒj of water, and beginning with ten minims three times a day, increasing it to ʒj three times a day."

He has sometimes seen other indolent tumours reduced or removed by it. A very bad case of what appeared diseased pylorus yielded to a combination of it with Prussic acid in St. Thomas's Hospital. In the Medico-Chirurgical Transactions, vol. iii. p. 544, Dr. Elliotson states,

"of the powers of iodine in bronchocele we have abundant testimony; I have seen sufficient to satisfy myself: and they would seem equally great in certain other structural diseases."

Dr. Manson appears, from his work on iodine, to have used it in a great variety of cases, and with extraordinary success—extraordinary, since few medicines have been found so uniformly beneficial. "Between March, 1821, and July, 1825, he prescribed at least 180 ounces of it."

In a tabular view of 116 cases of bronchocele, it appears that he has cured by this medicine 76, considerably relieved 10, and there were improving under its use 17.

He has also found it serviceable in different kinds of paralysis.

In chorea 62 cases were cured out of 72.

With respect to the efficacy of iodine in scrofula and scrofulous ophthalmia, his experience warrants him in pronouncing it to be by far the most powerful and energetic medicine that he has employed in these diseases.

He has availed himself, since 1822, of every case of fistula lachrymalis that has come under his management, to ascertain the curative powers of iodine in this disease, and every additional case confirms him more and more in the belief of the great remedial powers of this substance in this disease.

Its effects as a remedy he found very conspicuous in deafness.

He has used it in dysphagia, and believes that when employed early it will cure those forms of the disease which have hitherto been considered incurable.

The benefits which he has seen result from its internal exhibition in white swelling, he states, justify the most sanguine expectation from its powers as a constitutional remedy, if early exhibited and steadily persevered in

The trials he has made with it in cases of distortion of the spine have afforded him the most convincing proofs of the great power of this remedy over this obstinate and often fatal disease.

The following are the formulæ which are used by Dr. Manson:—

TINCTURA IODINI.

℞. Iodini..... ℥ i.
Spiritus Rectificati (sp. gr. 116).... ℥ iiss.
Solve, terendo in vase vitrio.

LIQUOR IODINI.

℞. Potassæ Hydriodatus..... gr.xxxvi.
Iodini..... gr.x
Aquæ Distillatæ..... ℥ x.
Solve, terendo in vase vitrio.

SOLUTIO IODINI.

℞. Potassæ Hydriodatis..... gr.xxiv.
Aquæ Distillatæ..... ℥ i.
Solve, terendo in vase vitrio.

LINIMENTUM IODINI.

℞. Linimenti Saponis Comp..... ℥ i.
Tincturæ Iodini..... ℥ i.
Misce.

UNGUENTUM IODINI.

℞. Potassæ Hydriodatis..... ℥ ss.
Adipis Præparatæ ..... ℥ i.
Misce.

The tincture, liquor, and solution are used in the same dose. Dr. Manson begins with ten drops, three times a day, in a wine-glassful of water, to adults.

Dr. Copland, whose extensive and accurate therapeutic knowledge renders his remarks very valuable, has kindly informed the writer that he has used the hydriodate of potass with success in enlargements of liver and spleen, as well as in many glandular diseases. He uses it internally in much weaker doses than have been recommended by others, and stops it at the end of six weeks, finding that its medicinal action continues, recommencing its exhibition at the end of a fortnight or three weeks.

Dr. Baron and Dr. Gairdner have also written on the use of iodine, and consider it a very valuable medicine. In the work of the latter gentleman there is an interesting case given, showing the effects of this powerful substance when used too freely ; as it is alluded to in the body of this

work, and as it may be of important service to the young practitioner, it is here given in the doctor's words.

"A young English lady, at a boarding-school at Paris, had for some time been afflicted with goitre. Her brother was prosecuting the study of medicine there. With the characteristic zeal of a young man, as soon as he heard of the wonderful effects of iodine, he determined on making trial of its powers on his sister. He did not find much difficulty in persuading her to become the subject of his experiments, nor did he encounter more difficulty on the part of the French gouvernante to whose care she was confided. The remedy succeeded, as usual, in greatly diminishing the tumour, and for some time no bad effects were apparent. A small hard knot only remained in the situation which had been occupied by a considerable swelling before; and the desire to get rid of this little tumour was the cause of the remedy having been pushed too far. Its deleterious effects first showed themselves by gnawing pain at the upper part of the stomach, great anxiety, and oppression. These symptoms were disregarded, and the remedy persevered in for a week longer, during which time the patient became very much emaciated; she was frequently affected with vomiting, the pain of the abdomen became more frequent and more severe, and the thirst was very distressing. I was sent for early in the morning, in consequence of an alarming diarrhœa, which had come on during the night, and I found her in a deplorable condition indeed. Her brother, and the mistress of the boarding-school, were so alarmed at the consequences of their conduct, that they were quite unfit to give any evidence about her treatment: they could hardly, indeed, give me a coherent account of what had passed; and the poor young lady was therefore intrusted to the care of servants. She was then suffering the most excruciating pain at the stomach, violent cramps, and convulsive action of the muscles of the arms, back, and legs, from which she had scarcely any intermission. The vomiting and purging were almost incessant. The dejections were bloody, slimy, and very scanty, but at first had been copious and feculent. The matter vomited was of a dark green colour streaked with

blood. The tongue was loaded with a thick crust, resembling in colour the matter vomited. The countenance was pale, contracted, and with that peculiar expression which announces abdominal suffering. The pulse was small, hard, and frequent, scarcely indeed to be numbered. The whole appearance of the patient was such as to excite well-grounded fears for her life. Being quite unable to swallow, four grains of opium were directed to be thrown into the rectum. They were not, however, long retained, and were not productive of benefit. An anodyne embrocation was therefore applied to the pit of the stomach, fomentations to the feet; and as soon as it could be got ready she was placed in a warm bath. This so much quieted the irritation of the stomach, that she was enabled to swallow about thirty drops of laudanum, from which there was a decided alleviation of her sufferings for nearly an hour. During ten days she remained in a very doubtful state, subject to frequent severe attacks of diarrhœa, with intense pain of the bowels. Her emaciation during this time was most extraordinary. The expression of her French nurse, 'dé-charnée,' was literally applicable to her; her arms and body were almost fleshless—her breasts, which had been large, were now perfectly flat—the calves of her legs had quite disappeared—and her thighs were not much thicker than her wrists, when in health. I never witnessed any thing like such attenuation in so short a space of time. By the steady and very liberal use of opium, she recovered to a certain degree; but when I last saw her, many months after her illness, she remained subject to frequent violent spasms of the stomach, during which opium alone gave her relief. Her nervous system had been much shattered. She repeatedly declared to me that she seldom enjoyed an hour's respite from the most wretched depression of spirits, and since her illness had never felt any thing like her former buoyancy of mind. The few moments of ease she knew were purchased by large doses of laudanum, to the habitual use of which her sufferings had forced her. She was still very pale, and her emaciation, though much less, was yet very great. She was indeed a miserable monument of the effect of iodine. I heard of this young lady a

few weeks ago; she was then much better, had in a great degree recovered her looks, and was able to leave off the use of opium almost entirely. Her stomach, however, still remained very weak, and obliged her to be very careful of her diet. The bronchocele had not returned, but the small hard swelling mentioned above remained still very sensible to the touch, but not evident to the eye."

CROTON TIGLIUM.

The oil of the seeds of this plant is now generally kept in the shops in this country, and is not unfrequently prescribed by physicians of eminence; when genuine it is a very speedy, and, in a proper dose, safe purgative, in cases in which powerful purgatives in general are safe. The writer has used it with caution, and has never seen any bad effects to result from its use. He has never given more than two drops. A non-medical relative of his, a few weeks ago gave to his servant, a strong young man, who was labouring under obstinate constipation, three drops of the oil; it produced evacuations in the course of fifteen minutes, and soon afterward his sight failed him, and he became quite blind; in four or five days he recovered the sight of one eye, the other was not restored for a fortnight from the time of taking the oil. Dr. Copland informs the writer that he has given the Croton oil in conjunction with the oil of turpentine, with great advantage in a case of tetanus.

CHLORURETS OF SODA AND OF LIME.

Chlorine, in combination with lime and with soda, is becoming extensively used in this country, under the names of chlorurets of oxide, of sodium, and of lime, chloride of lime, &c. They have been proved to be valuable disinfecting agents, and have been found of considerable efficacy in the treatment of hospital gangrene, phagedenic, syphilitic, and ill-conditioned ulcers, mortification, &c. Mr. Alcock in his very excellent Essay on the Use of Chlorurets, mentions a case of small-pox, in which there was a very dis-

tressing apthous and sloughy state of the fauces, under the free use of a gargle of diluted chloruret of oxide of sodium ; the sloughs separated, and the parts healed rapidly. He has used it also in ozæna, ophthalmia, gonorrhœa, and in some other inflammations of the mucous membrane, with apparent benefit.

In the treatment of a case of *punctured wound, received in dissection*, the inflammation was proceeding up the arm with alarming rapidity, and the pain and tension were extreme ; the patient experienced immediate relief from the diluted chloruret of oxide of sodium, used as a lotion, combined with the free use of leeches. The patient recovered without any untoward circumstance.

Mr. Alcock has used it with decided advantage in sinous ulcers connected with diseased joints ; in one case, which had been condemned to amputation, in consequence of anchylosus, the motion of the joint (the ankle) was so far restored by its use, that the patient was enabled to walk with a degree of freedom that could not have been anticipated.

In another case of diseased elbow-joint (the patient a boy of scrofulous diathesis), repeated abscesses and sinuses formed around the joint, which was greatly enlarged. For many months the total immobility of the forearm upon the arm, induced the expectation of anchylosis. The solution of the chloruret was used as a lotion and injection, the usual constitutional treatment was employed at the same time ; the motion of the joint became in a considerable degree restored, his general health improved, and at the time Mr. A. wrote, there was but little enlargement, and only two superficial ulcers.

Dr. Elliotson informs the writer, that a solution of chloruret of soda, applied to the gums every hour or two, he has found almost invariably to remove mercurial ptyalism in a very few days. If the skin be off, then of course the mouth will be sore until the healing process has had time for its completion.

In a case of fœtid discharge from the vagina, that was pronounced a case of diseased uterus by several, this lotion effected a cure. In St. Thomas's Hospital, he states, that

the chlorurets of soda is found very effectual in the cure of many chronic ulcers.

Dr. Copland, consulting physician to Queen Charlotte's Lying-in-Hospital, and senior physician to the Royal Infirmary for Children, has in a very handsome manner given to the writer the following valuable information. He has prescribed the chlorurets of lime and of soda with considerable advantage in the last stage of typhus fever, when the evacuations have been highly offensive in draughts of aromatic water, with mucilage: he has also given them with enemata, and has found them to be of great service in gargles in scarlatina. In chronic diarrhœa, and in dysentery, he has also used them with benefit.

The fluid of Labarraque he has employed internally in various cutaneous diseases, and has found it to be very efficacious in the various forms of porrigo, and in several chronic diseases of the skin.

He likewise states that Mr. Denby, surgeon to the Infirmary for Children, has, by his recommendation, used this remedy very extensively in this institution in cutaneous diseases.

Dr. Copland has employed the chlorurets in various other diseases, and with varied success, and considers them as valuable additions to our list of medicinal agents.

Mr. Fincham, of Manchester, has a paper in the Medico-Chirurgical Review Journal for 1827, on the chloride of soda and chloride of lime, which he states are preferable to the chlorurets of Labarraque, in which he says the gas is too rapidly evolved, and liable to excite irritation, and by decomposing the water, to lose its peculiar properties.

When used internally, and the chlorine is too rapidly evolved by the presence of an acid in the stomach, he ays ammonia will give instant relief.

The solution of the chloruret of lime has been used with success as a collyrium in purulent ophthalmia, at the Royal Westminster Infirmary for Diseases of the Eyes, by Mr. Guthrie.*

* See Medical and Physical Journal, November, 1827.

For sloughing ulcers and fœtid discharges, the writer has used the chloruet of soda with great satisfaction ; and as a general disinfectant it has always proved a very valuable agent. He has used it to remove the high game odour which grouse is apt to have in August, and has been enabled to surprise the cook by bringing back what she had condemned as too far gone. The writer performed this epicurean restoration last summer on grouse.

The chlorurets have been said to have great power in facilitating the germination of seeds, but this fact is not altogether new.

A very valuable paper upon chlorurets, by Mr. Farrady, will be found in the Journal of Science and Art, Vol. II. N. S. p. 84.

And one by Dr. Granville in the same work, Vol. I. No. 2.

Mr. R. Phillips has written upon the chloruets in the Annals of Philosophy, for May, 1827.

A Translation from M. Labarraque has been published by Mr. Scott.

The new remedies are powerful agents, and may be used with benefit to the diseased by experienced practitioners, who by much observation have learned not only what medicine is suited to a particular disease, but also what degree of medicinal energy is required to meet the peculiar form, and every circumstance connected with the individual case ; what are the proper combinations required, and how the dose must be varied. The young practitioner should, when using these heroic remedies, remember-- CAVENDO TUTUS.

FINIS.